Series 1953, No. 7 Issued July 1959

SOIL SURVEY

Blount County Tennessee

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
TENNESSEE AGRICULTURAL EXPERIMENT STATION
TENNESSEE VALLEY AUTHORITY

HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of Blount County will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid foresters in managing woodlands; and add to the soil scientists' fund of knowledge.

In making this survey, soil scientists walked over the fields and woodlands. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in growth of crops, weeds, and brush; and, in fact, recorded all things about the soils that they believed might affect their suitability for farming, engineering, forestry, or related uses.

The scientists plotted boundaries of the soils on aerial photographs. Then, cartographers prepared from the photographs the detailed soil map in the back of this report. Fields, woods, roads, and many other landmarks can be seen on the map.

Locating the soils

Use the index to map sheets to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show the areas of the county that each sheet of the large map covers. When the correct sheet of the large map is found, it will be seen that the boundaries are outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. Suppose, for example, an area located on the map has the symbol Ba. The legend on the detailed map shows that this symbol identifies Barbourville fine sandy loam, gently sloping phase. This soil and all the others mapped in the county are described in the subsection, Descriptions of Soils.

Finding information

Few readers will be interested in all of the report, for it has special sections for different groups. The introductory part, which mentions physiography, geology, climate, and gives some statistics on agriculture, will be of interest mainly to those not familiar with the county.

Farmers and those who work with farmers can learn about the soils in the subsection, Descriptions of Soils, and then turn to the section, Use, Management, and Estimated Yields. In this way they first identify the soils on their farm and then learn how these soils can be managed and what yields can be expected. The soils are grouped by capability units in tables that give estimated yields under two levels of management for the soils of the unit. Capability units are groups of soils that need similar management and respond to this management in about the same way. For example, in the soil description of Barbourville fine sandy loam, gently sloping phase, it is shown to be in capability unit I-1. The management this soil needs will be given in the subsection, Capability unit I-1.

Foresters and others interested in management of woodlands can refer to the subsections, Forest Management and Descriptions of Soils.

Engineers will want to refer to the section, Engineering Characteristics of Soils. Several tables in this section give characteristics of the soil that affect engineering.

Soil scientists will find information about how the soils were formed and how they were classified in the section, Genesis, Classification, and Morphology.

Fieldwork for this survey was completed in 1953. Unless otherwise indicated, all statements in the report refer to conditions at that time. This publication of the soil survey of Blount County, Tenn., is part of the technical assistance furnished to the Blount County Soil Conservation District.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C.

Contents

Series 1953, No. 7

Issued July 1959

SOIL SURVEY OF BLOUNT COUNTY, TENNESSEE

By JOE A. ELDER, in charge, and SAMUEL R. BACON, Soil Conservation Service, United States Department of Agriculture, and ROBBIE L. FLOWERS, THEODORE R. LOVE, JOSEPH A. PHILLIPS, GEORGE M. THOMPSON, and DOYLE A. TUCKER, Tennessee Agricultural Experiment Station

Correlation by MAX J. EDWARDS, Soil Conservation Service

United States Department of Agriculture in cooperation with Tennessee Valley Authority and Tennessee Agricultural Experiment Station

BLOUNT COUNTY, one of the oldest counties in Tennessee, was created by the Territorial Legislature on July 11, 1795—10 years after the settlement of the area began (*7*).[1] The present population consists largely of descendants of the early settlers, who came mostly from Virginia and North Carolina. The population of the county in 1950 was 54,691 of which 67.8 percent was rural. Maryville, the county seat, has a population of 7,742, and adjacent Alcoa has a population of 6,355.

At one time Blount County was chiefly agricultural, but now it is an agricultural-industrial region. Although most of the population is rural, many part-time farmers depend on industry for part of their income. Most farms are small, and many farmers produce only for home use. Corn, wheat, lespedeza, and many other crops are grown. Tobacco is the most important cash crop, and forest products are important on some farms. Dairy products and livestock seem to be increasing. This soil survey was made to provide a basis for the best agricultural use of the land.

General Character of the Area

Blount County is in the southeastern part of Tennessee (fig. 1). It covers an area of about 579 square miles, or 370,560 acres. Maryville, the county seat, is 15 miles south of Knoxville. The county is bounded on the north by Knox County and the Tennessee River, on the west by Monroe and Loudon Counties, and on the east by Sevier County. The southern boundary coincides with the Tennessee-North Carolina state line.

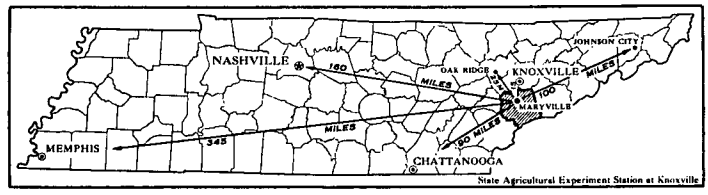


Figure 1.—Location of Blount County in Tennessee.

Physiography, Geology, Relief, and Drainage

Blount County lies within two major physiographic divisions—the Great Smoky Mountains and the valley of East Tennessee, which is a part of the Great Valley. About 55 percent of the county is in the valley, and the rest is in the Great Smoky Mountains. Most of the area in the mountains is in the Great Smoky Mountains National Park.

The Great Valley section of the county is a lowland belt (*6*) that has a series of alternate linear ridges and valleys. These ridges and valleys extend in a southwest-northeast direction parallel to the Great Smoky Mountains. The relief is prevailingly rolling to hilly, although it ranges from nearly level to very steep. In most places, the difference in elevation between the stream bottoms and adjacent ridge crests ranges between 50 and 200 feet,[2] although the difference is greater in places. Sinkholes are prevalent, and some of the areas underlain by limestone have a karst relief.

The underlying strata of the Great Valley section include limestones, dolomites, shales, and sandstones of lower Paleozoic Age, mainly Cambrian and lower Ordovician. The rocks have been subjected to intense earth movements of the geologic past. They are so closely folded and faulted that many beds are now inclined at high angles or are actually overturned.

The succession of parallel ridges and valleys that are characteristic of this province is a result of differential geologic erosion of the limestones, dolomites, shales, and sandstones. Practically all of the ridges in the Great Valley section are underlain by low-grade dolomites, sandstones, or shales. The valleys between the ridges are underlain by high-grade limestones and interbedded limestones and shales. These limestones and shales weather comparatively rapidly. The various geologic formations in the valley, listed according to the geologic column, are (*9*) : Rome formation, Rutledge limestone, Rogersville shale, Maryville limestone, Nolichucky shale, Knox dolomite, Chickamauga limestone, Athens shale, Holston marble, Tellico sandstone, Sevier shale, Bays sandstone, Chattanooga black shale, and Grainger shale.

That part of the county within the Great Smoky Mountains is a rugged area of steep-walled, V-shaped valleys and narrow winding ridge crests and sharp peaks. The crests of the highest ridges or peaks are about 5,000 feet above sea level. Thunderhead Mountain, along the Tennessee-North Carolina line, has an

[1] Italic numbers in parentheses refer to Literature Cited, p. 119.

[2] Information from Tennessee Valley Authority topographic maps.

altitude of 5,530[3] feet, the highest point in the county. The underlying strata of this region are chiefly slates and quartzites of pre-Cambrian and early Cambrian Age.

The county is drained by the Tennessee, Little Tennessee, and Little Rivers. Small streams, many of which are intermittent, are abundant nearly everywhere. Chiefly because of the subterranean streams, the areas underlain by limestone do not have a well-defined pattern of surface drainage. The areas underlain by shales and sandstones, however, do have a well-defined pattern.

Climate

Blount County has a humid-temperate climate. Winter is moderate, but short cold periods do occur. Summer is hot. The average annual precipitation of about 48 inches is well distributed and includes about 9 inches of snow. The data shown in table 1 are compiled from the records of the United States Weather Bureau station at Knoxville in adjoining Knox County.

Temperature and precipitation vary from place to place in the county. These variations are caused by differences in the lay of the land, including direction of slope and the effect of relief on drainage, differences in elevation, and differences in distances from mountains. Frosts frequently kill vegetation in the valleys and depressions while the vegetation on the ridges is not injured. Fruit trees are injured by frost less frequently on ridgetops and north-facing slopes than elsewhere. The mountain region, which is not an important agricultural area, has more precipitation, including more snow, than the rest of the county. It also has a cooler temperature, more fog and cloudiness, and a shorter frost-free period.

The average frost-free season is 191 days. It extends from April 14, the average date of the latest killing frost, to October 25, the average date of the earliest.

Although the rainfall is fairly well distributed throughout the year, it is slightly greater in summer than in any other season. The least rainfall is in fall. Severe droughts are rare, but periods of deficient rainfall do occur, especially in fall. Periods of excessive rainfall are rather frequent. Most of the rains are light to medium heavy. Although the annual rainfall is ample for the most exacting crops, the unfavorable distribution and the loss in runoff sometimes cause reduced crop yields. Destructive hailstorms and tornadoes occur infrequently.

The climate is favorable for the growth of practically all the common crops. The frost-free season is long enough for the important summer annuals to mature. Perennial, biennial, and winter annual crops are successfully grown, especially on the well-drained soils.

TABLE 1.—*Temperature and precipitation at Knoxville, University of Tenn., Knox County, Tenn.*

[Elevation, 974 feet]

Month	Temperature[1]			Precipitation[2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1875)	Wettest year (1930)	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	40.3	78	8	4.52	2.30	7.21	0.7
January	38.8	78	7	4.66	2.19	6.92	1.4
February	41.9	76	5	4.51	3.78	10.18	.8
Winter	40.3	78	5	13.69	8.27	24.31	2.9
March	48.7	85	21	5.05	4.41	13.07	.3
April	58.0	88	27	4.14	1.39	5.86	(3)
May	67.2	92	36	3.75	4.21	1.23	0
Spring	58.0	92	21	12.94	10.01	20.16	.3
June	74.0	103	47	4.10	2.60	4.96	0
July	77.1	105	53	4.36	1.86	7.64	0
August	76.2	100	48	3.92	2.03	5.60	(3)
Summer	75.8	105	47	12.38	6.49	18.20	(3)
September	70.6	97	44	2.68	4.56	4.14	0
October	59.9	91	27	2.62	1.44	2.81	0
November	47.9	81	9	3.07	2.90	4.25	(3)
Fall	59.5	97	9	8.37	8.90	11.20	(3)
Year	58.4	105	5	47.38	33.67	73.87	3.2

[1] Average temperature based on an 85-year record, through 1955; highest and lowest temperatures on a 9-year record, through 1952.

[2] Average precipitation based on an 85-year record, through 1955; wettest and driest years based on a 72-year record, in the period 1854-1952; snowfall based on a 7-year record, through 1952.

[3] Trace.

Water Supply

The water supply for farm homes and livestock is generally adequate in Blount County. Most of the water for farm homes is furnished by wells and springs, but it is supplemented by tanks and cisterns. As electricity is extended into rural areas, deep wells with electric pumps are becoming common. The many perennial streams and springs furnish most of the water for livestock, but cisterns, tanks, and artificial ponds are also used. Because of the underground streams, the water supply in limestone areas is more of a problem than it is in the shale and sandstone areas. During winter and spring, many intermittent streams carry an adequate supply of water for livestock.

Economic and Cultural Facilities

The Great Valley section of the county has ample highways and railroads. Farm-to-market transportation facilities are very good. The Southern and the Louisville and Nashville Railroads pass through the county, which is also served by two Federal highways and many hard-surfaced State and county highways. Gravel roads reach practically all parts of the county except areas within the Smoky Mountains National Park. In 1950, 984 farms were on hard-surfaced roads,

[3] Elevations are from Tennessee Valley Authority topographic maps.

1,723 were on gravel roads, and 210 on dirt or unimproved roads.

Knoxville, in adjoining Knox County, is the principal market for the agricultural products of the county. Maryville is the most important market and trading center within the county.

All communities have schools and churches. Practically all parts of the county have school bus service and rural mail delivery. Telephones serve most areas, and electric power has been extended to practically all parts of the county. In 1954, 2,763 farms had electricity and 1,497 had telephones.

The largest industrial plant in the county is an aluminum company, which employs several thousand people. Other plants include two textile mills, a fertilizer plant, and a variety of small factories.

Agriculture

About 67 percent of the people of Blount County are classed as rural, but many of these people depend on industry for at least part of their livelihood. According to the 1954 census, the income earned from nonfarm sources by the families on 1,607 farms exceeded the value of farm products sold on these farms. There were 1,722 farmers who worked off the farm 100 days or more.

The census reported 894 commercial farms in the county in 1954. Generally a farm that has a value of sales products amounting to $1,200 or more is classed as commercial. There were 725 part-time farms and 1,260 residential farms. A part-time farm is one on which the value of products sold is $250 to $1,199 if the operator worked off the farm for 100 days or more, or if the nonfarm income received by him and his family was greater than the value of the farm products sold. A residential farm is one on which the value of farm products sold is less than $250.

In 1954, 47.1 percent of the land area of Blount County was in farms; about half of the rest was in forest of the Great Smoky Mountains National Park. The farms of the county vary greatly in size, but most of them are small. In 1954 only 3 farms were larger than 1,000 acres, but 1,768 farms were smaller than 50 acres. The large number of small farms in the county is partly the result of industrial growth. The 1954 census listed the number of farms by size of farms as follows:

Acres:	*Number of farms*
Less than 10	552
10 to 29	735
30 to 49	481
50 to 69	319
70 to 99	258
100 to 139	205
140 to 179	110
180 to 219	55
220 to 259	34
260 to 499	83
500 to 999	12
1,000 and more	3

The farm enterprises are diversified, and production on many of the farms is for home use. In 1954 the census listed the number of farms by type of farms as follows:

Type of Farm:	*Number*
Livestock other than dairy or poultry	232
Field Crops	270
Cash grain	25
Other field crops	245
Dairy	145
Poultry	50
General	185
Primarily crop	55
Primarily livestock	25
Crop and livestock	105
Miscellaneous and unclassified	2,001

Farming practices

The farming practices in the county differ according to the different kinds of soils, the patterns of soil distribution, the lay of the land, and the size of farms. Modern machinery is generally used on the larger farms in the more nearly level areas. In the hilly and steep areas and on very small farms, much of the work is done with horse-drawn implements and by hand labor. Small grains are generally harvested with grain binders, but small combines are used where comparatively large acreages of grain are grown. Most of the corn is harvested by hand. Much of the small grain is planted in the fall and harvested in June or July. Grasses and legumes are sown either in fall or in spring. Corn is usually planted in April or May.

A wide variety of crops is grown, but many farmers do not use systematic rotations. The needs of the farmer or the fertility of the field normally determines the crop to be grown. A rotation of corn, small grain, and grass and clover is commonly used on many farms.

The use of lime and commercial fertilizers has steadily increased during recent years. The most commonly used fertilizers are mixed fertilizers such as 3-9-6,[4] 5-10-5, 4-12-4, or 6-12-12, and 16 or 20 percent superphospate. These fertilizers are used to some extent on all the field crops, and large amounts are used on tobacco and truck crops. The use of phosphatic fertilizers and lime on pastures and hay meadows is becoming common. The barnyard manure is used chiefly on tobacco.

Crops

Most of the farmers of Blount County produce feed for livestock and food crops for home use. The commercial farmer generally has several farming enterprises, and practically all farms have some livestock. Forest products are an important source of income on a few farms. The chief crops are corn, wheat, lespedeza, and tobacco, but a wide variety of crops is grown. Most of the crops are used on the farm, but some corn and hay and all the tobacco is sold. Practically all the feed is fed to livestock, which are sold.

Table 2 gives the acreage of principal crops and the number of fruit trees in the county. Corn is grown on nearly all farms. It is the most important crop grown for food and for livestock feed. Hay crops, mainly lespedeza, red clover, or alfalfa, are grown on most

[4] Percentages, respectively, of nitrogen, phosphoric acid, and potash.

farms. At one time red clover was an important hay crop, but during the last 20 years lespedeza has been the most extensive hay crop. Although the alfalfa crop is relatively small, it is rapidly increasing in importance.

Large acreages of wheat and oats are grown, but they are not so widespread as corn and hay crops. The acreage of the other small-grain crops is small. Small grain is used as feed for livestock and winter cover or pasture, although some wheat is used to make flour. Burley tobacco, the most important strictly cash crop, is grown in very small acreages on a great many farms. Fruits, berries, Irish potatoes, sweetpotatoes, and a wide variety of vegetables are grown on practically all farms for home use. Vegetables are grown by a few farmers as a cash crop.

TABLE 2.—*Acreage of the principal crops and numbers of fruit trees of bearing age in stated years*

Crop	1929	1939	1949	1954
	Acres	*Acres*	*Acres*	*Acres*
Corn for all purposes	26,551	24,209	15,683	11,603
Wheat threshed	7,437	6,891	5,380	3,855
Oats threshed	806	2,513	7,370	6,168
Rye threshed	18	124	92	92
Barley threshed	883	1,722	404	867
Soybeans (harvested for beans) grown alone	(1)	54	327	199
Hay crops, total	20,560	27,923	26,060	25,751
Alfalfa	510	1,307	2,745	3,239
Annual legumes	3,556	2,091	730	1,181
Clover, timothy, and grass mixtures	4,396	2,057	1,751	2,348
Lespedeza	(1)	17,507	16,345	10,116
Small grains	1,130	971	1,181	5,165
Other hay cut	10,968	3,990	3,308	3,702
Tobacco	512	722	885	864
Potatoes, Irish	479	547	[2]230	[3]132
Sweetpotatoes and yams	429	352	[2]149	[3]32
Vegetables for home use or for sale	1,160	959	507	273
Sorghum except for sirup	54	77	47	146
	Number[4]	*Number*[4]	*Number*[4]	*Number*
Apple trees	29,650	22,356	15,625	4,646
Peach trees	40,152	15,885	4,550	531

[1] Not reported.
[2] Acreage for farms with less than 15 bushels harvested is not included.
[3] Acreage for farms with less than 20 bushels harvested is not included.
[4] One year later than year given at head of column.

Pasture

In 1954 Blount County had 79,315 acres of pasture. The cropland that was used only for pasture amounted to 37,640 acres, and there was 18,061 acres of woodland in pasture. The remaining 23,614 acres in pasture included rough land, land in brush, and any other pasture that was not on woodland or cropland.

Permanent pasture is largely on soils that are too steep or too stony to be easily cultivated or on soils that are very shallow to bedrock. Some of the soils of the bottom lands that are too poorly drained to be cultivated are also used for pasture. Rotation pastures furnish a considerable part of the pasturage in the county. They may be on any soils that are suitable for crops. The most important pasture plants are orchardgrass, timothy, fescue, bluegrass, white clover, Ladino clover, red clover, and lespedeza.

The quality of the pasture varies according to the kind of soil and the management. The level of pasture management generally has not been so high as that for field crops, but many farmers are improving their pastures. They are using complete fertilizers and are controlling grazing and weeds.

Livestock and livestock products

The livestock in Blount County consists mainly of cattle, sheep, hogs, horses, mules, and chickens. Table 3 lists the number of livestock on farms in stated years. The trend in the county is toward an increase of livestock farms, particularly those for beef and milk production.

TABLE 3.—*Number of livestock on farms in stated years*

Livestock	1930	1940	1950	1954
	Number	*Number*	*Number*	*Number*
Horses and colts	1,984	[1]2,264	1,957	998
Mules and mule colts	2,252	[1]1,936	1,366	911
Cattle and calves	15,445	[1]15,965	21,764	27,165
Sheep and lambs	3,861	[2]1,276	966	825
Swine	9,254	[3]9,064	12,989	10,804
Chickens	[1]91,512	[3]98,047	[3]106,885	[3]109,587

[1] Over 3 months old.
[2] Over 6 months old.
[3] Over 4 months old.

Farm power

Horses and mules used to provide most of the farm power, but in recent years tractors have replaced many of the draft animals, especially on the larger farms. From 1945 to 1950 the number of tractors in the county increased from 562 to 1,038. By 1954 there were 1,720 tractors. From 1940 to 1954 the number of horses and mules decreased from 4,200 to 1,909.

The Soils of Blount County

The soils of Blount County have developed in a humid-temperate climate under a relatively uniform forest. In the county there are great differences in slope, kinds of parent material, and length of time the material has been in place. Accordingly, there are great differences among the soils.

In texture and consistence, the soils vary from loose incoherent sand to very firm clay. The surface soil is predominantly silt loam, or silty clay loam and is, for the most part, friable. The subsoil is mainly silty clay and clay but some places is silty clay loam; it ranges from friable to very firm.

In color, the soils range from nearly white to red and include gray, yellow, and brown. Colors intermediate between brown and gray predominate for the surface

soil, whereas red and yellow predominate for the subsoil.

The soils are prevailingly rolling to hilly but range from nearly level to very steep. The degree of erosion varies greatly. Many of the soils are uneroded or only slightly eroded, some are moderately eroded, others are severely eroded. Loose fragments of rock that interfere with cultivation are common in many soils.

Most of the soils are well drained. A small part of the acreage consists of small areas of poorly drained soils. Soils intermediate in drainage are more common than the poorly drained soils, but they are not extensive.

Soil Series and Their Relations

In table 4 the 43 soil series of Blount County are placed in four groups according to topographic position: (1) Soils of the uplands, (2) soils of the terrace lands, (3) soils of the colluvial lands, and (4) soils of the bottom lands. This grouping will aid in identifying the soil series and in showing the relation of one to the other. In addition to the topographic grouping, table 4 gives for each series the parent rock or parent material, drainage, and relief.

Soils of the uplands

The soils of the uplands were derived from the underlying bedrock. They normally occur above the stream valleys. The soils generally are closely related to the underlying rocks from which the parent material has weathered. In Blount County, there are five classes of rocks: (1) Limestone, (2) shale, (3) sandstone, (4) quartzite, and (5) slate.

The Decatur, Dewey, Dunmore, and Fullerton soils were derived from the residuum of dolomitic limestone. The limestone ranges from high grade underlying the Decatur soils to relatively low grade underlying the Fullerton soils. The Decatur soils have a dark-brown surface soil and a dark-red firm subsoil. The Dewey soils have a brown surface soil and a red firm subsoil. The Fullerton soils have a yellowish-brown surface soil and a yellowish-red moderately firm subsoil. The Dunmore soils were derived from materials weathered from clayey dolomitic limestone. They are similar to the Fullerton soils but are shallower to bedrock, have thinner soil layers and a firmer subsoil, and overlie bedrock that is probably less dolomitic than that under the Fullerton soils.

The Talbott and Colbert soils have developed in residual materials that weathered from argillaceous, or clayey, limestone (Chickamauga). They normally occur in rolling to hilly areas that have many outcrops and many sinks, ponds, and subterranean streams. The Talbott soils have a yellowish-brown surface soil and a yellowish-red very firm subsoil. They are generally 2 to 3 feet to bedrock. The Colbert soils have a yellowish-brown surface soil and a yellow very firm subsoil. Their average depth to bedrock is about 18 inches.

The Sequoia, Christian, Litz, Montevallo, Teas, Lehew, and Dandridge are upland soils derived chiefly from shales. The Dandridge, Litz, Montevallo, Teas, and Lehew soils have many shale particles throughout the profile. They are shallow to bedrock. The Dandridge soils were derived from the residuum of calcareous shale. The Litz and Montevallo soils were derived mainly from acid shales, but the parent rock of the Litz soils contains, in places, thin lenses of limestone or calcareous shale interbedded with the acid shale. The Lehew and Teas soils were derived from interbedded shales, sandstones, and siltstones. The Teas soils differ from the Lehew soils in being browner or redder. Their bedrock contains lenses of calcareous shale, whereas the bedrock of the Lehew is acid. The Sequoia soils were derived mainly from acid shales that contain, in places, thin lenses of limestone or calcareous shale. The limestone makes up only a small part of the bedrock. The Farragut soils are associated with the Sequoia soils but differ from them in being darker colored throughout the profile and in containing more limestone in the bedrock. The Sequoia soils have a yellowish-brown surface soil and a yellowish-red firm subsoil; the Farragut soils have a dark-brown surface soil and a dark-red subsoil. The Christian soils were derived from sandy shales. They are similar to the Sequoia soils but are more friable and coarser textured.

The Tellico soils have developed in residual materials that weathered from calcareous sandstone. In places the sandstone bedrock contains lenses or seams of sandy shale. These soils have a brown or dark-brown surface soil and a red friable subsoil. They occur mainly on steep relief.

The Bland soils have developed in residual materials that weathered from a reddish-colored calcareous mudstone. The bedrock is not uniform from place to place and in many places contains lenses or pockets of sandstone. These soils average about 18 inches to bedrock. They are predominantly reddish brown throughout the profile.

The Ramsey soils occur on steep mountainous relief. They were derived from slates, quartzites, and sandstones. They vary considerably from place to place in depth and distinctness of soil horizons, but generally they are shallow and weakly developed. They are light yellowish-brown or yellowish-brown rocky fine sandy loam and silt loam.

Soils of the terrace lands

In the distant past, the rivers and streams of the county flowed at higher levels. At these levels, they deposited gravel, sand, and clay on their flood plains. During the process of stream cutting, the channel was gradually deepened and new flood plains were formed at the lower levels. But the remnants of the older higher lying flood plains were left. These areas are now above the overflow stage of the present streams, and they constitute terrace land. They consist of general stream alluvium.

Soils of the terrace lands are members of the Cumberland, Etowah, Waynesboro, Holston, Sequatchie, and Whitwell series. These soils differ principally in color, texture, consistence, drainage, and parent materials. The Cumberland and Etowah soils were derived from old mixed alluvium that was greatly affected by limestone materials. The Waynesboro, Se-

TABLE 4.—*Soil series of Blount County, Tenn., grouped according to topographic position, parent rock, drainage, and relief*

Parent rock or parent material	Excessively drained[1] (rolling to very steep)	Well drained[2] (undulating to steep)	Imperfectly drained[3] (nearly level to rolling)	Poorly drained[4] (nearly level)
SOILS OF THE UPLANDS				
Sedimentary rocks:				
High-grade dolomitic limestone		Decatur (dark red)		
High-grade dolomitic limestone		Dewey (red)		
Low-grade dolomitic limestone		Fullerton[5]		
Slightly clayey dolomitic limestone		Dunmore		
Clayey limestone		Talbott		
Clayey limestone		Colbert		
Calcareous sandstone and sandy shales		Tellico[5]		
Limestone containing thin lenses of shale		Farragut		
Acid shales with thin lenses of limestone and calcareous shale		Sequoia		
Calcareous shale		Dandridge[5]		
Acid shale with lenses of calcareous shale or limestone		Litz[5]		
Acid shale	Montevallo			
Interbedded shales and sandstones, thin lenses of which are calcareous	Teas			
Quartzite, sandstone, shale, and slate	Ramsey			
Interbedded acid shale and sandstone	Lehew			
Red calcareous sandstone	Bland			
Sandy shale		Christian		
SOILS OF THE TERRACE LANDS				
Old general alluvium:				
Chiefly limestone		Cumberland		
Chiefly limestone		Etowah		
Sandstone, shale, quartzite, slate, and limestone		Waynesboro		
Sandstone and shale		Holston		
Sandstone, shale, quartzite, slate, and some limestone influence		Sequatchie	Whitwell	
SOILS OF THE COLLUVIAL LANDS				
Young and old local alluvium and some colluvium:				
Chiefly high-grade limestone		Hermitage		
Chiefly high-grade limestone		Emory[5]		
Relatively low-grade of siliceous limestone		Minvale		
Relatively low-grade of siliceous limestone			Pace[6]	
Siliceous or low-grade limestone		Greendale[5]		
Sandstone, quartzite, slate, shale, and limestone		Hayter (brown)		
Sandstone, quartzite, slate, shale, and limestone		Allen (red)		
Sandstone, shale, and quartzite		Jefferson (yellow)		
Calcareous sandstone		Alcoa		
Calcareous sandstone		Neubert[7]		
Slates and shales		Muse		
Quartzite, shale, sandstone, and slate		Barbourville[7]		
Shales			Leadvale[6]	
Calcareous shales			Whitesburg[6]	
SOILS OF THE BOTTOM LANDS[7]				
Mixed alluvium from sandstone, quartzite, shale, slate, and some limestone		Staser	Hamblen	Prader.
Mixed alluvium from limestone materials			Lindside	Melvin.
Alluvium from sandstone and quartzite	Bruno			

[1] These soils have an indistinct profile because of rapid geological erosion; surface drainage is rapid to very rapid; internal drainage is slow to very rapid; color varies with parent material.

[2] Brown or reddish-brown to yellowish-brown soils, free of mottlings to a depth of 30 inches or more.

[3] Pale-yellow soils (alluvial soils grayish brown) mottled below about 15 inches.

[4] Brownish-gray to light-gray soils mottled below 6 to 8 inches.

[5] Excessively drained to well drained.

[6] Well drained to imperfectly drained.

[7] These soils do not have distinct textural horizons, mainly because their parent materials have been in place for only a short time.

quatchie, and Whitwell soils were derived from old alluvium that was washed chiefly from standstone and shale that had an admixture of limestone. The Holston soils were developed from old alluvium, chiefly derived from sandstone and shale.

The Cumberland and Etowah soils have a brown surface soil and a red subsoil; the surface soil of the Cumberland soils is browner than that of the Etowah soils, and the subsoil is darker red and less friable. The surface soil of the Waynesboro soils is lighter colored and thicker than that of the Cumberland soils, and its subsoil is lighter red. The Holston soils are yellow and moderately well drained or well drained. The Sequatchie soils are brown, well-drained soils on the low terraces. The Whitwell soils were derived from parent materials similar to those of the Sequatchie soils, but they are imperfectly drained and generally occur on low terraces.

Soils of the colluvial lands

The soils of the colluvial, or local-alluvial, lands occur at the base of slopes, particularly the long, eroded slopes. Their parent materials were derived from soil materials and rock fragments that rolled or were washed from the adjacent slopes. These soils occur along small drainways at the base of upland slopes, and on small, sloping colluvial-alluvial fans where small streams have deposited material over the flood plains of larger streams.

The Hermitage and Emory soils were formed from materials washed mainly from the Decatur, Dewey, Cumberland, and other darker colored soils of the uplands and terraces. They are brown or reddish-brown, well-drained soils that differ chiefly in age. The Emory soils are young and differ very little in texture throughout their profile. The Hermitage soils have distinct surface soil and subsoil layers. They further differ from the Emory soils in being susceptible to erosion.

The Greendale, Minvale, and Pace soils have developed chiefly from materials washed from the Dunmore, Fullerton, and other lighter colored soils that were derived from limestone. The Greendale soils have a light yellowish-brown or pale-brown surface soil and a brownish-yellow or yellowish-brown subsoil. Their subsoil is only slightly finer textured than their surface layer. The Minvale soils have a yellowish-brown surface soil and a yellowish-red subsoil, and the Pace soils have a yellowish-brown surface soil and a brownish-yellow or yellow subsoil. These soils have distinct surface and subsoil layers, whereas the profile of the Greendale soils differs little throughout its depth.

The Muse, Leadvale, and Whitesburg soils were derived from materials that were washed from soils of the uplands underlain mainly by shale. The Leadvale soils have parent materials that have washed mostly from Sequoia, Montevallo, Litz, and Dandridge soils. They have a yellowish-brown surface soil and a yellow or brownish-yellow firm subsoil and are imperfectly to moderately well drained. The Muse soils have a yellowish-brown surface soil, a yellowish-red subsoil, and are well drained. The Whitesburg soils are darker colored and lack distinct surface-soil and subsoil layers. Nearly always they have developed from material washed from the Dandridge soils.

The Allen, Jefferson, Hayter, and Barbourville soils have developed largely from materials that rolled or were washed from the Ramsey soils, which were derived chiefly from quartzites and slates. Almost everywhere, the Allen and Hayter soils are influenced to some extent by limestone materials. The Jefferson soils have a light yellowish-brown surface soil and a yellow or brownish-yellow subsoil. The Allen soils have a yellowish-brown surface soil and a yellowish-red or red subsoil, whereas the Hayter soils have brown surface soil and strong-brown to yellowish-red subsoil. The Barbourville soils are pale brown to yellowish-brown and well drained. They occur in recent colluvium and lack distinct surface-soil and subsoil layers.

The Alcoa and Neubert soils were derived from materials that were washed from uplands underlain by sandstone. The Alcoa soils have a brown surface soil and a red or reddish-brown friable subsoil. Their parent materials have been washed from the Tellico soils. The Neubert soils are the young colluvial associates of the Alcoa soils. They have a brown or dark-brown surface soil and a reddish-brown subsoil.

Soils of the bottom lands

The soils of the bottom lands occur on nearly level areas along the streams that are likely to overflow. These soils were derived from material carried by the streams. Their character therefore depends largely upon the source of the material and the mixing and sorting action of the streams. The soils of the bottom lands are young. Unlike the material of most of the soils of the uplands and terraces, this material has not lain in place long enough for well-defined surface-soil and subsoil layers to develop. The differences between the soils of the bottom lands are closely related to differences in kind of alluvium and drainage.

The Staser, Hamblen, and Prader soils occur on alluvium that was washed from uplands underlain by quartzite, sandstone, and shale that contained some limestone or calcareous shale material. The differences among these soils are closely related to differences in drainage. The Staser soils are well drained and predominantly brown or yellowish brown throughout the profile. The Hamblen soils are imperfectly drained and grayish brown or yellowish brown; they are splotched with gray and yellow below depths of 12 to 20 inches. The Prader soils are poorly drained and predominantly gray throughout.

The Bruno soils occur on alluvium that was washed from uplands underlain by sandstone and quartzite. They are very sandy and droughty.

The Lindside and Melvin soils occur on alluvium that was washed from uplands underlain chiefly by limestone. The differences in these soils are chiefly the result of differences in drainage. The Lindside soils are imperfectly drained and dark yellowish brown or brown; they are splotched with yellow and gray below depths of 12 to 20 inches. The Melvin soils are poorly drained and gray below depths of 6 to 10 inches.

469687—59——2

Descriptions of Soils

This subsection is provided for those who want detailed information about soils. It describes the single soils, or mapping units, in this county; that is, the areas on the detailed soil map that are bounded by lines and identified by a letter symbol. For more general information about the soils, the reader can refer to the section, Soil Associations, in which broad patterns of soils are described.

In this subsection the soils are described in approximate alphabetic order. All the soils of one series that have the same texture in the surface layer are together. For example, all Dewey soils that have a silty clay loam surface soil come together, and then all Dewey soils that have a silt loam surface soil.

An important part of the soil description is the soil profile, a record of what the soil scientist saw when he dug into the ground. If only one profile is given for a series, it is to be assumed that all other soils in the series have essentially the same kind of profile. The difference, if any, is probably in the texture of the surface soil or in the thickness of the surface soil. To illustrate, a detailed profile is given for Dewey silty clay loam, eroded gently sloping phase, and the reader is to conclude that all other Dewey soils have essentially this kind of profile. The differences, if any, are explained. If the profiles of the soils of a series differ significantly, more than one profile is described. For the Dunmore series two profiles are given, one for Dunmore silty clay loam, eroded gently sloping phase, and one for Dunmore silt loam, sloping phase. For the Allen series, three profiles are described.

Following the name of each soil, or mapping unit, are two sets of parentheses. In the first set is the slope range of the soil; in the second is the symbol used to identify the soil on the detailed map. The description that follows points out erosion, slope, or other properties that distinguish this particular soil from the others.

Frequently the characteristics emphasized for a single soil are those that directly affect their management. For example, there are three Dewey soils that have a silty clay loam surface soil and are similar in profile and in degree of erosion; these soils, however, differ in slope, a characteristic that affects their management. To simplify the description of management, soils that need similar management are placed in capability units. The capability unit of each soil is given in that part of the soil description headed *Use and suitability*. Suggested management for the soils of each capability unit is given in the section, Use, Management, and Estimated Yields.

The location and distribution of the single soils are shown on the soil map at the back of this report. The approximate acreage and proportionate extent are given in table 5. It will be helpful to refer to the section, Soil Survey Methods and Definitions, where "series," "types," "phases," and other special terms used in describing soils are listed. The Glossary at the end of the report defines many other special terms.

TABLE 5.—*Approximate acreage and proportionate extent of the soils mapped*

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Alcoa loam, eroded gently sloping phase	253	0.1	Cumberland silty clay loam, eroded moderately steep phase	868	0.2
Alcoa loam, eroded sloping phase	1,845	.5	Cumberland silty clay, severely eroded sloping phase	394	.1
Alcoa loam, eroded moderately steep phase	388	.1	Cumberland silty clay, severely eroded moderately steep phase	1,138	.3
Allen fine sandy loam, eroded sloping phase	312	.1	Dandridge silt loam, sloping phase	2,720	.7
Allen fine sandy loam, moderately steep phase	294	.1	Dandridge silt loam, moderately steep phase	3,428	1.0
Allen cobbly fine sandy loam, moderately steep phase	775	.2	Dandridge silt loam, steep phase	10,077	2.7
Allen clay loam severely eroded moderately steep phase	135	(1)	Dandridge shaly silty clay loam, eroded moderately steep phase	1,335	.4
Allen silt loam, eroded sloping phase	954	.3	Dandridge shaly silty clay loam, eroded steep phase	1,125	.3
Allen silt loam, moderately steep phase	1,359	.4	Dandridge shaly silt loam, very steep phase	986	.3
Allen silty clay loam, severely eroded moderately steep phase	522	.1	Decatur silty clay loam, eroded gently sloping phase	1,573	.4
Allen cobbly silt loam, moderately steep phase	726	.2	Decatur silty clay loam, eroded sloping phase	8,409	2.2
Barbourville fine sandy loam, gently sloping phase	2,304	.6	Decatur silty clay loam, eroded moderately steep phase	1,885	.5
Barbourville silt loam, gently sloping phase	3,248	.9	Decatur silty clay, severely eroded sloping phase	524	.1
Barbourville silt loam, sloping phase	294	.1	Decatur silty clay, severely eroded moderately steep phase	2,271	.6
Bland silt loam, sloping phase	545	.1	Dewey silty clay loam, eroded gently sloping phase	2,051	.5
Bland silt loam, steep phase	1,388	.4	Dewey silty clay loam, eroded sloping phase	15,126	4.0
Bland silty clay loam, eroded steep phase	499	.1	Dewey silty clay loam, eroded moderately steep phase	3,988	1.1
Bruno loamy fine sand	555	.1	Dewey silt loam, sloping phase	1,409	.4
Christian loam, eroded gently sloping phase	178	(1)	Dewey silt loam, moderately steep phase	750	.2
Christian loam, eroded sloping phase	1,560	.4	Dewey silty clay, severely eroded sloping phase	1,431	.4
Christian loam, moderately steep phase	367	.1	Dewey silty clay, severely eroded moderately steep phase	5,404	1.4
Christian loam, eroded moderately steep phase	887	.2			
Christian clay loam, severely eroded sloping phase	536	.1			
Christian clay loam, severely eroded moderately steep phase	1,653	.4			
Colbert silty clay loam, eroded sloping phase	225	.1			
Cumberland silty clay loam, eroded gently sloping phase	409	.1			
Cumberland silty clay loam, eroded sloping phase	2,052	.5			

TABLE 5.—*Approximate acreage and proportionate extent of the soils mapped*—Continued

Soil	Area	Extent
	Acres	*Percent*
Dunmore silty clay loam, eroded gently sloping phase	1,406	0.4
Dunmore silty clay loam, eroded sloping phase	8,946	2.4
Dunmore silty clay loam, eroded moderately steep phase	4,828	1.3
Dunmore silty clay loam, eroded steep phase	284	.1
Dunmore silt loam, sloping phase	2,324	.6
Dunmore silt loam, moderately steep phase	2,309	.6
Dunmore silt loam, steep phase	189	.1
Dunmore silty clay, severely eroded sloping phase	358	.1
Dunmore silty clay, severely eroded moderately steep phase	2,729	.7
Emory silt loam, level phase	406	.1
Emory silt loam, gently sloping phase	9,978	2.7
Emory silty clay loam, gently sloping phase	1,097	.3
Etowah silt loam, eroded gently sloping phase	497	.1
Etowah silt loam, eroded sloping phase	600	.2
Farragut silty clay loam, eroded gently sloping phase	1,240	.3
Farragut silty clay loam, eroded sloping phase	1,797	.5
Farragut silty clay, severely eroded sloping phase	896	.2
Fullerton cherty silt loam, moderately steep phase	320	.1
Fullerton cherty silt loam, eroded moderately steep phase	330	.1
Fullerton cherty silt loam, steep phase	368	.1
Fullerton cherty silt loam, eroded steep phase	261	.1
Greendale silt loam	2,379	.6
Gullied land, limestone material	1,269	.3
Gullied land, shale or sandstone material	2,384	.6
Hamblen silt loam	2,707	.7
Hamblen silt loam, local alluvium phase	4,036	1.1
Hamblen loam	1,124	.3
Hayter silt loam, gently sloping phase	761	.2
Hayter silt loam, sloping phase	767	.2
Hayter stony silt loam, gently sloping phase	243	.1
Hayter stony silt loam, sloping phase	610	.2
Hermitage silt loam, gently sloping phase	882	.2
Hermitage silt loam, eroded gently sloping phase	1,679	.4
Hermitage silt loam, eroded sloping phase	2,798	.7
Holston fine sandy loam, eroded sloping phase	536	.1
Jefferson fine sandy loam, gently sloping phase	384	.1
Jefferson fine sandy loam, eroded sloping phase	1,360	.4
Jefferson fine sandy loam, moderately steep phase	559	.1
Jefferson fine sandy loam, steep phase	454	.1
Jefferson cobbly fine sandy loam, sloping phase	1,236	.3
Jefferson cobbly fine sandy loam, moderately steep phase	2,121	.6
Leadvale silt loam, gently sloping phase	709	.2
Leadvale silt loam, eroded gently sloping phase	483	.1
Leadvale silt loam, eroded sloping phase	309	.1
Lehew very fine sandy loam, very steep phase	2,315	.6
Lindside silt loam	2,249	.6
Litz silt loam, sloping phase	3,845	1.0
Litz silt loam, gently sloping phase	296	.1
Litz silt loam, moderately steep phase	2,963	.8
Litz shaly silty clay loam, eroded moderately steep phase	1,712	.5
Litz shaly silty clay loam, eroded sloping phase	857	.2
Melvin silt loam	572	.2
Minvale silt loam, eroded gently sloping phase	356	.1
Minvale silt loam, eroded sloping phase	966	0.3
Montevallo shaly silt loam, moderately steep phase	1,031	.3
Montevallo shaly silt loam, steep phase	2,655	.7
Muse silt loam, eroded gently sloping phase	692	.2
Muse silt loam, eroded sloping phase	1,436	.4
Muse silt loam, eroded moderately steep phase	171	(1)
Neubert loam	2,705	.7
Pace silt loam, gently sloping phase	724	.2
Pace silt loam, eroded sloping phase	345	.1
Prader silt loam	1,908	.5
Ramsey slaty silt loam, steep phase	20,526	5.5
Ramsey slaty silt loam, very steep phase	80,722	21.6
Ramsey stony fine sandy loam, very steep phase	22,461	6.0
Rockland, limestone, sloping	693	.2
Rockland, limestone, moderately steep	4,422	1.2
Rockland, slate or quartzite, steep	1,697	.5
Sequatchie fine sandy loam	462	.1
Sequatchie loam	741	.2
Sequatchie silt loam	1,409	.4
Sequoia silty clay loam, eroded gently sloping phase	3,865	1.0
Sequoia silty clay loam, eroded sloping phase	7,537	2.0
Sequoia silty clay, severely eroded sloping phase	2,622	.7
Staser fine sandy loam	1,141	.3
Staser loam	1,104	.3
Staser silt loam	1,115	.3
Stony colluvial land	1,907	.5
Talbott silty clay loam, eroded sloping phase	1,357	.4
Talbott silty clay loam, eroded moderately steep phase	258	.1
Talbott silty clay, severely eroded sloping phase	665	.2
Talbott silty clay, severely eroded moderately steep phase	864	.2
Talbott silt loam, moderately steep phase	226	.1
Talbott-Colbert very rocky silty clay loams, eroded sloping phases	1,495	.4
Talbott-Colbert very rocky silty clay loams, eroded moderately steep phases	1,961	.5
Teas loam, steep phase	415	.1
Tellico loam, eroded sloping phase	3,326	1.0
Tellico loam, eroded moderately steep phase	1,977	.5
Tellico loam, steep phase	1,723	.5
Tellico loam, eroded steep phase	3,616	1.0
Tellico loam, very steep phase	1,799	.5
Tellico clay loam, severely eroded moderately steep phase	2,591	.7
Tellico clay loam, severely eroded steep phase	1,802	.5
Waynesboro loam, eroded gently sloping phase	253	.1
Waynesboro loam, eroded sloping phase	1,320	.4
Waynesboro loam, eroded moderately steep phase	639	.2
Whitesburg silt loam, gently sloping phase	838	.2
Whitwell loam	656	.2
Building sites	1,760	.5
Mines and pits	53	(1)
Water	1,836	.5
Total	373,760	100.0

[1] Less than 0.1 percent.

Alcoa loam, eroded gently sloping phase (2 to 5 percent slopes) (Aa).—This soil of the old colluvial lands is deep and well drained. It occurs on foot slopes where sediments formed by geologic erosion have accumulated. It has developed in materials that rolled or were washed from uplands underlain by calcareous sandstone. In Blount County the main source of the parent materials is Tellico soils. The native vegetation was a forest consisting mostly of deciduous trees.

This soil is associated with Neubert and Tellico soils. It differs from the young Neubert soils in being moderately well developed.

Profile description:

0 to 12 inches, dark reddish-brown very friable loam; weak fine granular structure; upper 1 to 2 inches stained dark with organic matter.

12 to 44 inches, reddish-brown friable clay loam; weak fine blocky structure; many black specks and stains; a few black concretions.

44 to 60 inches, yellowish-red friable clay loam; texture almost silty clay loam; weak fine blocky structure; many black specks and stains; contains a few black concretions.

This soil contains a medium amount of organic matter and plant nutrients. It is medium acid to strongly acid. It is permeable to roots, air, and moisture. Water is readily absorbed, and the water-supplying capacity is high. This soil is easy to work and conserve.

Most of this mapping unit is slightly to moderately eroded, but a few included areas are uneroded.

Use and suitability (Capability unit IIe-1).—Nearly all of this soil is used for crops or pasture. Very little of it is idle each year. It is well suited to corn, tobacco, truck crops, alfalfa, red clover, crimson clover, and other field crops and pasture plants.

This soil is deficient in lime, phosphorus, potassium, and nitrogen. Because the slopes are gentle and the risk of erosion slight, rotations can be short.

Alcoa loam, eroded sloping phase (5 to 12 percent slopes) (Ab).—This soil of the old colluvial lands is deep and well drained. It occurs in irregularly shaped medium-sized and small areas, mostly in the northwestern part of the county.

This soil is like Alcoa loam, eroded gently sloping phase, except that it has lost more surface soil through erosion and is somewhat shallower. It is unevenly eroded; consequently, the surface soil differs from place to place. In most places it is brown to dark-brown friable loam, 5 to 6 inches thick. The subsoil is red, yellowish-red, or reddish-brown friable clay loam. In a few severely eroded spots the subsoil is exposed.

Included in this mapping unit is a small acreage that is relatively uneroded.

Use and suitability (Capability unit IIIe-1).—Nearly all of this soil has been in crops or pasture for many years. Less than 5 percent is idle each year. It is well suited to the common crops, including corn, tobacco, truck crops, small grains, alfalfa, red clover, white clover, Ladino clover, crimson clover, orchardgrass, and fescue.

This soil is moderately deficient in lime, phosphorus, potassium, and nitrogen. Because there is a moderate risk of erosion, rotations should run 3 years or longer and should include only 1 row crop.

Alcoa loam, eroded moderately steep phase (12 to 25 percent slopes) (Ac).—This is a deep, well-drained, friable soil. It occurs in scattered medium-sized and small areas on old colluvial foot slopes, immediately below the parent Tellico soils. It is slightly more eroded than Alcoa loam, eroded gently sloping phase; the horizons are thinner and the colluvial deposits shallower. The surface soil is reddish-brown or brown friable loam, 4 to 5 inches thick. The subsoil is red friable clay loam.

Because it is unevenly eroded, the surface soil varies from place to place. In some places subsoil material is mixed with remnants of the original surface soil, and the resulting surface layer is finer textured than loam. A small acreage is relatively uneroded and has a thicker surface soil than the rest of this soil.

This soil contains a medium amount of organic matter and plant nutrients. It is medium acid. It is easy to work, but, because of the strong slopes, it is moderately difficult to conserve. It is permeable to roots. Water is rapidly absorbed, and the water-supplying capacity is high.

Use and suitability (Capability unit IVe-1).—Nearly all of this soil is used for crops and pasture. Only about 3 percent is still in forest. Little is idle. This soil is well suited to all the common crops and is used extensively for tobacco, vegetables, and other row crops. Because of the risk of further erosion, it should not be planted to row crops more often than once every 4 or 5 years.

Allen fine sandy loam, eroded sloping phase (5 to 12 percent slopes) (An).—This soil of the old colluvial lands is deep and well drained. It occurs in scattered, irregularly shaped, medium-sized and small areas along the base of Chilhowee Mountain and in mountain coves. It occupies foot slopes and low crests where sediments formed by geologic erosion have accumulated. Most of it is underlain by limestone at a depth of 3 feet or more. The parent material was derived mostly from acid sandstone but contains some material weathered from limestone. In Blount County most of the parent materials have rolled or been washed from Chilhowee Mountain. This soil has developed under a mixed forest of pines and hardwoods. It is associated with the Jefferson and Barbourville soils.

Profile description:

0 to 8 inches, pale-brown nonplastic fine sandy loam; very friable when moist; soft when dry; weak fine granular structure.

8 to 12 inches, strong-brown nonplastic fine sandy loam; very friable when moist; soft when dry; weak fine subangular blocky structure.

12 to 17 inches, yellowish-red slightly plastic clay loam; friable when moist; soft to slightly hard when dry; moderate medium and fine subangular blocky structure.

17 to 41 inches, red slightly plastic clay loam, nearly clay in texture; friable when moist; slightly hard when dry; moderate medium subangular blocky structure.

41 to 60 inches +, red moderately plastic sandy clay or clay loam; few, fine, distinct brownish-yellow mottles; friable when moist; slightly hard when dry; moderate medium blocky structure.

In some places this soil is underlain by limestone residum at a depth of about 7 feet. A few small angular fragments of sandstone or quartzite occur in some places. These fragments are not numerous enough to interfere with cultivation. The surface soil is unevenly eroded; consequently, its thickness and texture vary slightly from place to place. Included are a small acreage that is uneroded and a small acreage on slopes of 2 to 5 percent.

This soil is strongly acid and of low natural fertility. It is permeable throughout to roots, air, and moisture. It is easy to work and moderately easy to conserve.

The water-supplying capacity is about medium. Rainfall is readily absorbed and runoff is normally low.

Use and suitability (Capability unit IIIe-2).—Nearly all of this soil has been cropped for many years. A small part is in cutover forest of pines and hardwoods. Any of the common crops of the county can be grown.

This soil is very deficient in lime, phosphorus, potassium, and nitrogen, but it responds well if the needed amendments are applied. Because of the moderate risk of erosion, it is not suited to intensive cropping nor to rotations shorter than 3 years.

Allen fine sandy loam, moderately steep phase (12 to 25 percent slopes) (Ao).—This soil of the old colluvial lands is deep and well drained. It occurs in medium-sized areas on mountain foothills, mostly along the base of Chilhowee Mountain. It is shallower than Allen fine sandy loam, eroded sloping phase. The thickness of the colluvial deposit generally varies more from place to place. This soil is associated with Jefferson, Barbourville, and other Allen soils.

The surface layer is pale-brown very friable fine sandy loam between 3 and 7 inches thick. The subsoil is red or yellowish-red friable clay loam. In almost all places the colluvial deposit is underlain by limestone.

This soil is medium to low in natural fertility and medium in water-supplying capacity. Because of its moderately steep slopes, runoff is rapid and is likely to cause erosion.

Use and suitability (Capability unit IVe-1).—About half of this soil is used for field crops and pasture. Much of it is in unimproved pasture and some is idle. If adequately fertilized, this soil is well suited to close-growing crops and to pasture. Because it is likely to erode, it is not well suited to row crops. If it is used for row crops, they should be grown only occasionally in long rotations consisting mostly of close-growing crops.

Allen cobbly fine sandy loam, moderately steep phase (12 to 25 percent slopes) (Ah).—This soil of the old colluvial lands is deep and well drained. It occurs mostly in medium-sized areas along the foothills of Chilhowee Mountain where sediments formed by geologic erosion have accumulated. The parent materials have been washed from the uplands. They were derived chiefly from sandstone and quartzite but include some materials weathered from limestone. This soil has developed under a mixed forest of pines and hardwoods. It is associated with Jefferson, Barbourville, and other Allen soils.

Profile description:

0 to 6 inches, yellowish-brown very friable cobbly fine sandy loam; moderate fine granular structure.
6 to 13 inches, strong-brown very friable cobbly fine sandy loam; weak fine subangular blocky structure.
13 to 19 inches, yellowish-red friable cobbly clay loam; moderate medium subangular blocky structure.
19 to 42 inches, red friable sandy clay; moderate medium subangular blocky structure.
42 inches +, red to yellowish-red friable sandy clay; few, fine, distinct brownish-yellow mottles; moderate medium blocky structure.

Included with this soil are about 60 acres that have 5 to 12 percent slopes. Most of this acreage lies in narrow bands on ridgetops.

This soil is strongly acid. It is low in organic matter and plant nutrients. There are many angular and subangular fragments of sandstone, 2 to 10 inches in diameter, on the surface and in the soil. This soil is very permeable to roots, air, and moisture. Rainfall is readily absorbed; but because the soil is porous, the water-supplying capacity is only moderate.

Use and suitability (Capability unit VIs-2).—Most of this soil is in cutover forest of pines and a few hardwoods. If cleared, this soil would be best suited to permanent pasture. It is not well suited to cultivated crops because it is steep, cobbly, and droughty. It would be relatively better suited to early maturing crops than to those that mature late in summer or early in fall. Some areas are too cobbly to be cultivated at all. Excellent pastures can be established if large amounts of lime, phosphate, nitrogen, and potash are applied.

Allen clay loam, severely eroded moderately steep phase (12 to 25 percent slopes) (Ae).—This soil of the old colluvial lands is deep and well drained. It occurs in small areas scattered through the mountain coves and foothills. It resembles Allen fine sandy loam, eroded sloping phase, but is more severely eroded. Nearly all of the original surface soil has been removed by erosion; in some places the upper part of the subsoil has also been removed. In most places the plow layer is entirely subsoil.

Because this soil is unevenly eroded and has been mixed by cultivation, it varies from place to place. The upper 6 inches is yellowish-brown to yellowish-red friable clay loam. Beneath this is a yellowish-red or red friable to firm silty clay loam or sandy clay. In almost all places the colluvial deposit is underlain by limestone at a depth of 3 feet or more.

This soil is strongly acid. It is medium to low in natural fertility. The water-supplying capacity is medium to low. Where the original surface soil has been lost, this soil is difficult to work and to conserve, but it is still permeable to roots, air, and moisture.

Use and suitability (Capability unit IVe-3).—This soil has been overcropped. Most of it is now idle or is used for unimproved pasture. A few areas are reverting to poor forest; a few areas are used for row crops, mainly corn. The pasture consists of a sparse growth of weeds and lespedeza.

Because it is severely eroded, this soil is only fair for crops and pasture. Good tilth is difficult to maintain. The moisture range within which this soil can be tilled is narrow. In some areas shallow gullies interfere with tillage. Management requirements are very exacting. Some crops can be grown, but yields are generally low.

This soil is suited to the pasture and hay plants commonly grown in the county. Under a high level of management, fair to good pastures can be established and maintained. After a period of good pasture management, the fertility and physical properties of this soil should be improved enough so that crops could be grown in long rotations.

Allen silt loam, eroded sloping phase (5 to 12 percent slopes) (Ap).—This soil of the old colluvial lands is

deep and well drained. It occurs in medium-sized and small areas on foothills and in mountain coves. Most areas are underlain by limestone at a depth of 3 feet or more. The parent materials rolled or were washed from mountainous uplands underlain chiefly by slates. The native vegetation was forest, mostly of deciduous trees. This soil is closely associated with the Muse, Hayter, Barbourville, and other Allen soils.

Profile description:

0 to 7 inches, yellowish-brown or brown friable silt loam; weak fine granular structure.
7 to 11 inches, strong-brown friable silty clay loam; moderate medium subangular blocky structure; layer is transitional between surface soil and subsoil.
11 to 15 inches, yellowish-red nearly firm silty clay loam; strong coarse subangular blocky structure.
15 to 39 inches, red to yellowish-red, firm or nearly firm silty clay loam; strong coarse subangular blocky structure.
39 to 50 inches, red firm silty clay loam splotched or mottled with reddish yellow and brownish yellow; strong medium to coarse subangular blocky structure.

The surface soil is 4 to 8 inches thick. Chiefly because of erosion, the surface layer differs from place to place. Where some of the original surface soil has been mixed with subsoil by tillage, the texture of the surface soil is finer than it is in undisturbed areas. In some areas the subsoil contains a few small platy fragments of slate. In the lower subsoil these fragments are as much as 3 millimeters in diameter. Included are a few small areas on slopes of 2 to 5 percent and a few relatively uneroded areas.

This soil is medium acid to strongly acid, and about medium in natural fertility. It is permeable to roots, air, and moisture. It is moderately easy to work and to conserve. The water-supplying capacity is about medium.

Use and suitability (Capability unit IIIe-2).—Most of this soil is used for crops. About 15 percent is in unimproved pasture and 10 percent is idle. This soil is well suited to all the crops common to the county. If adequately fertilized and in other ways well managed, it produces good pasture and high yields of row crops and hay. Rotations should be moderately long—3 or more years—because of the risk of further erosion.

Allen silt loam, moderately steep phase (15 to 25 percent slopes) (Ar).—This soil occurs in medium-sized and large areas along mountain foothills and on the strong slopes of mountain coves. It resembles Allen silt loam, eroded sloping phase, but has formed in a thinner colluvial deposit and is shallower over the limestone residuum. This soil is about medium in natural fertility and medium in water-supplying capacity.

Use and suitability (Capability unit IVe-1).—Most of this soil remains in forest. Because of overcutting and burning, the stand is thin in some places. Much of this soil, however, is in the Great Smoky Mountains National Park, where the forest is protected from these hazards.

This soil is well suited to close-growing crops and pasture. Because of the moderately steep slopes and the risk of erosion, it is not well suited to row crops. If it is used for row crops, they should be grown in long rotations that consist mainly of close-growing crops. This soil is productive if it is adequately fertilized.

Allen cobbly silt loam, moderately steep phase (12 to 25 percent slopes) (Al).—This soil is deep and well drained. It occurs in medium-sized and large areas on mountain foothills and around the heads of mountain coves.

The surface soil is brown or yellowish-brown friable cobbly silt loam about 7 inches thick. The subsoil is yellowish-red cobbly silty clay loam. The underlying material is generally limestone residuum, but in a few areas it is slate residuum. The depth of the deposit is generally more than 2 feet. Included with this soil are a few areas on 5 to 12 percent slopes and a small acreage that is slightly or moderately eroded.

This soil is medium acid to strongly acid. It contains a moderate amount of organic matter and plant nutrients. A few to many 2- to 10-inch angular or subangular fragments of slate or quartzite are scattered over the surface and throughout the soil. This soil is permeable to plant roots, air, and water. It readily absorbs rainfall; but because it is cobbly and porous, it is somewhat droughty. Workability is poor and conservation is moderately difficult.

Use and suitability (Capability unit VIs-2).—Nearly all of this soil remains under forest that has been cut over and burned over several times. The few cleared areas are usually idle or used for unimproved pasture.

Because of the cobblestones and strong slopes, this soil is poorly suited to tilled crops. It is suited to all the common pasture plants, and good pastures can be maintained if they are well fertilized and otherwise well managed. However, unless there is an urgent need for additional pasture, this soil should be used for forest.

Allen silty clay loam, severely eroded moderately steep phase (15 to 25 percent slopes) (At).—This soil occurs on foothills and in mountain coves where sediments formed by geologic erosion have accumulated. Most of the sediments were derived from slate. The areas are medium sized and small and of irregular or polygonal shape. This soil is shallower than Allen silt loam, eroded sloping phase. It is so severely eroded that, in most places, the plow layer consists of subsoil.

The plow layer is yellowish-brown or yellowish-red silty clay loam. This layer differs from place to place, partly because of uneven erosion and partly because of mixing by tillage. The subsoil is yellowish-red or red silty clay loam that is moderately firm when moist and moderately hard when dry. In most places the underlying material is limestone residuum, which generally occurs at depths of more than 3 feet. Included with this soil are spots where part of the original surface soil remains.

This soil is medium acid to strongly acid. It is very low in organic matter and plant nutrients. It has rather poor tilth and is difficult to work and conserve. It can be worked within only a narrow range of moisture content. Even in areas that have lost all of the original surface soil, however, the plow layer is permeable to roots, air, and moisture.

Use and suitability (Capability unit IVe-3).—All of this soil has been overcropped. Most of it is now idle or in unimproved pasture. Many areas are in second-

growth pine, mainly Virginia pine. A few areas are used for corn, and a few areas are in improved pasture.

Because of the effects of erosion, this soil is not suited to tilled crops. Good stands of the common pasture plants can be established and maintained if the pastures are heavily fertilized and otherwise well managed.

Barbourville fine sandy loam, gently sloping phase (2 to 5 percent slopes) (Ba).—This well-drained soil occurs in small, irregularly shaped areas that are scattered along the foothills and in mountain coves. Many of these areas are in elongated, narrow hollows. This soil consists of material that recently rolled or was washed from adjacent upland soils—residual soils, such as the Ramsey soils, or colluvial soils, such as the Allen and Jefferson. It has formed at the base of slopes, on small fans where small lateral drains empty onto large flood plains, and along narrow intermittent drainageways. The native vegetation was a deciduous forest.

Profile description:

0 to 12 inches, yellowish-brown or brown very friable fine sandy loam; fine granular structure.
12 to 36 inches, brown or yellowish-brown to brownish-yellow very friable loam; moderate medium granular structure.
36 inches +, yellowish-brown friable loam mottled with olive yellow and pale yellow; depth of the colluvial deposit ranges from about 2 to 10 feet.

The color of this soil ranges from yellowish brown to dark grayish brown. In many areas the texture of the surface soil grades toward a loam. The texture varies in proportion to the amount of sand in the adjacent upland soils. In some places the subsoil is a light clay loam. A few areas on slopes of 5 to 12 percent are included. Also included is a small acreage that has many cobblestones and stones on the surface and throughout the soil.

This soil is medium acid to strongly acid. Compared to the surrounding upland soils, it is high in organic matter and plant nutrients. It is permeable to roots, air, and moisture. Water is readily absorbed, but the water-supplying capacity is only moderate. Except for the few stony or cobbly spots, this soil is very easy to work and conserve.

Use and suitability (Capability unit I-1).—Almost all of this soil is farmed. Most areas are used intensively for growing corn, tobacco, small grains, hay, and truck crops. This soil is well suited to intertilled crops if fertilizer and organic matter are applied. Small grains do not do well; they are likely to mature late, and to lodge or become diseased. Sediments washed from the adjoining slopes partially replenish the supply of organic matter and plant nutrients. Many of the areas are small and oddly shaped and cannot feasibly be farmed as separate units. These areas are farmed with the adjacent upland soils.

Barbourville silt loam, gently sloping phase (2 to 5 percent slopes) (Bb).—This well-drained soil lies on foot slopes, benches, and along narrow intermittent drainageways. It occurs in medium-sized and small irregularly shaped areas that are scattered throughout the part of the county underlain by acid rocks. This soil consists of recent local alluvium derived from slate and shale. Most of the soil material was washed from the slaty Ramsey soils.

Profile description:

0 to 14 inches, brown to grayish-brown very friable silt loam; moderate medium granular structure.
14 to 30 inches, grayish-brown, friable, heavy silt loam to light silty clay loam; moderate medium granular structure.
30 to 46 inches +, grayish-brown or yellowish-brown friable silt loam to light silty clay loam; few yellow mottles in lower part; depth of the deposit ranges generally between 2 and 10 feet.

The soil derived from slaty material is dominantly brown, grayish brown, and dark grayish brown; that derived from shale is dominantly yellowish brown and brown. Included are a few small areas where there are enough fragments to interfere with cultivation. These areas are identified on the soil map by stone symbols.

This soil is about medium acid. Compared to those on the adjacent uplands, it is moderately high in organic matter and plant nutrients. It is permeable to roots and air. Rainfall is absorbed rapidly, and the water-supplying capacity is high. This soil is easy to work and to conserve.

Use and suitability (Capability unit I-1).—Because this soil occurs in areas where there is little soil suitable for crops, almost all of it is used intensively for corn, small grains, tobacco, vegetables, or hay. This soil is suited to a wide variety of crops if it is managed properly. It is suited to all grasses and legumes grown in the area. The soil responds well to proper fertilization and to additions of organic matter. Good tilth is easily maintained.

Barbourville silt loam, sloping phase (5 to 12 percent slopes) (Bc).—This deep, well-drained soil lies chiefly on foot slopes or benches. It consists of materials that have recently washed from uplands underlain by slates or acid shales. The individual areas are very small and are narrow and elongated. A part of the acreage occurs in the Great Valley below slopes occupied by Litz and Sequoia soils, and the rest occurs in mountain coves below slopes of Ramsey soils.

The surface soil is a brown to grayish-brown very friable silt loam about 8 inches thick. The subsoil is a grayish-brown heavy silt loam or silty clay loam. Most areas are underlain by shale or slate generally at depths of 2 to 8 feet.

Compared to the adjacent uplands, this soil is fertile and productive. It is about medium acid. It is permeable and easy to work and to conserve.

Use and suitability (Capability unit I-1).—This soil is used intensively for corn, small grains, hay, tobacco, and vegetables. It is very valuable for crops since the adjacent upland soils are normally not suited to cultivated crops. All of the common crops are suitable. Because of the high moisture supply, good yields of the summer annual crops can be obtained.

Bland silt loam, sloping phase (5 to 12 percent slopes) (Bd).—This soil of the uplands is well drained to excessively drained and shallow. Nearly all of it occurs on narrow winding ridge crests flanked by steeper Bland soils. Very narrow elongated areas are

scattered thinly throughout the narrow belt of Bland soils along the eastern rim of the Great Valley. Like the other Bland soils, this soil has developed from red calcareous mudstone. The native vegetation was deciduous trees and a few redcedars.

Profile description:

0 to ½ inch, dark reddish-brown or very dusky red very friable silt loam; moderate fine crumb structure.
½ to 7 inches, dusky-red friable silt loam; moderate medium granular structure; a few small dusky-red partly weathered fragments of mudstone occur in most places.
7 to 20 inches +, weak-red or dusky-red firm silty clay loam or silty clay soil material mixed with red partly weathered rock fragments; red bedrock occurs at depths of 12 to 24 inches.

In areas where the soil is deeper than normal, the subsoil is a dusky-red firm clay. Bedrock outcrops in a few places. Included are some areas that are eroded and some areas that have slopes of 12 to 25 percent. The surface soil of some eroded areas is dusky-red silty clay loam. It is silty clay in the severely eroded spots. Bedrock outcrops are more common on the eroded and severely eroded areas and the average depth to bedrock is much less.

This soil is slightly acid. It is about medium in natural fertility. Because this soil is shallow, root development is restricted. Even in areas that have deeper than normal soil, the heavy clay subsoil retards the penetration of roots and the movement of air and moisture. Runoff is rapid. This soil is very droughty during dry periods. It is difficult to conserve, even on the milder slopes.

Use and suitability (Capability unit IIIs-1).—About 60 percent of this soil is in a badly cutover forest, mainly deciduous trees intermingled with some redcedar. Some cleared areas are idle but most are used for unimproved pasture.

This soil is not well suited to row crops. It is probably best suited to pasture, but even pasture yields are low because the soil is droughty. If fertilized and otherwise well managed, some of the less strongly sloping areas could be used for row crops, but yields would be low.

Bland silt loam, steep phase (25 to 50 percent slopes) (Be).—This shallow soil is well drained to excessively drained. It occurs extensively in medium-sized and large areas on steep upland slopes. It is shallower than Bland silt loam, sloping phase.

The surface soil is dusky-red friable silt loam. The subsoil is weak-red or dusky-red firm silty clay loam. In most places bedrock of red shaly limestone or mudstone occurs at depths of 10 to 18 inches, but outcrops of bedrock are common. Because this soil is clayey, infiltration is slow and runoff is very rapid.

Use and suitability (Capability unit VIs-1).—Nearly all of this soil is under native deciduous trees mixed with some redcedar. Chiefly because it is shallow and steep, this soil is very poorly suited to crops or pasture. Even under the best management, pasture yields would be low and the pasture would be difficult to establish and maintain. This soil probably is best suited to forestry.

Bland silty clay loam, eroded steep phase (25 to 50 percent slopes) (Bf).—This excessively drained, shallow soil occurs in medium-sized and small areas on steep upland slopes. Like the other Bland soils, it has developed from weathered red calcareous mudstone or shaly limestone. It is more severely eroded and shallower than Bland silt loam, sloping phase.

The surface soil is red or dusky-red silty clay loam. It is underlain by dusky-red silty clay material mixed with partly weathered red rock fragments. The depth to bedrock varies from place to place but is generally 10 to 14 inches. Bedrock outcrops in many places. Included are some severely eroded spots where the surface soil is silty clay.

Use and suitability (Capability unit VIs-1).—All of this soil has been cropped, but most of it is now in unimproved pasture. Some is idle, and some is in volunteer pine forest. The acreage now in crops is very small. Pastures generally are poor. The stands consist chiefly of broomsedge, weeds, briers, and some volunteer lespedeza.

This soil is poorly suited to crops or pasture. If properly fertilized, cleared of weeds and brush, and protected from overgrazing, some of the better areas might produce fair pasture. Because the soil is highly erosive and droughty, it is difficult to establish and maintain a cover of vegetation. Unless there is an urgent need for additional pasture, this soil should be used for forest.

Bruno loamy fine sand (0 to 3 percent slopes) (Bg).—This soil of the bottom lands is extremely sandy and excessively drained. It has developed on almost level flood plains in long, narrow areas next to streams. Much of it occurs along the Little River. The parent material is alluvium that was washed from upland soils underlain by sandstone and quartzite.

This soil is associated with the Staser, Hamblen, and Sequatchie soils. It is like the Staser soils in location and distribution, but it contains more sand and is lighter colored.

Profile description:

0 to 14 inches, yellowish-brown loose or noncoherent loamy fine sand.
14 inches +, yellowish-brown or brownish-yellow loose loamy fine sand; essentially structureless (single grain); strata of medium sand to fine gravel.

This soil is medium acid to strongly acid. It is low in organic matter. It does not hold enough moisture or fertilizer to keep plants growing well for long periods. It absorbs water very rapidly; but because it is porous, it is very droughty. This soil is easily worked with horse-drawn equipment, but traction is poor for tractors. The natural fertility is low.

Use and suitability (Capability unit IVs-2).—Almost all of this soil is used for crops and pasture. Some is idle, because it is likely to be flooded or because it is badly dissected by abandoned stream channels. The cultivated areas are used mainly for corn, small grains, and lespedeza.

This soil is not well suited to crops or pasture. It is better suited to crimson clover, small grains, vegetables, and other early maturing crops than it is to late maturing crops. A pasture sod is difficult to maintain.

Christian loam, eroded gently sloping phase (2 to 5 percent slopes) (Cc).—This soil of the uplands is well drained and moderately deep. It has a light-colored surface soil and a red or yellowish-red subsoil. It occurs mainly on low hilltops in small irregular areas flanked by the more strongly sloping Christian soils. It is scattered in the Great Valley portion of the county. This soil has developed in residuum weathered mainly from sandy shales that, in places, are interbedded with thin seams of sandstone and limestone. It has developed under deciduous trees with which a few pines are mixed.

This soil is associated with the Tellico and Sequoia soils. It is lighter colored, particularly in the surface soil, than the Tellico soils and has a firmer subsoil. It is somewhat similar to the Sequoia soils but contains more sand throughout the profile and is deeper to bedrock.

Profile description:

0 to 7 inches, yellowish-brown or brown very friable loam.
7 to 12 inches, when crushed, strong-brown, friable, light clay loam.
12 to 27 inches, red or yellowish-red moderately friable clay loam; moderate medium blocky structure.
27 to 38 inches +, red or yellowish-red friable clay loam, lightly splotched with brownish yellow in lower part; moderate fine and medium blocky structure; depths to the sandy shale bedrock are about 30 to 40 inches.

In places where the upper part of the subsoil has been mixed with the surface soil by tillage, the present surface soil is reddish and grades toward a clay loam. Included are a few areas that are relatively uneroded.

Christian loam, eroded gently sloping phase, is medium acid to strongly acid. It is low in organic matter and natural fertility. It is permeable to roots, air, and moisture. Rainfall is rapidly absorbed, and the water-supplying capacity is about moderate. This soil is easy to work and not difficult to conserve. The moderate depth—30 to 40 inches—may restrict the growth of roots of deep-rooted crops.

Use and suitability (Capability unit IIe-2).—About 90 percent of this soil has been cropped. About 50 percent of the total acreage is now in pasture, mainly unimproved. About 15 percent is idle each year. Practically all the common row crops are grown, mostly in small areas. Yields are low. If this soil is heavily fertilized, it is suited to the crops of the county.

Christian loam, eroded sloping phase (5 to 12 percent slopes) (Cd).—This soil of the uplands is well drained and moderately deep. It occurs in small areas on the crests and slopes of ridges. It has slightly thinner horizons than Christian loam, eroded gently sloping phase, and is slightly shallower to bedrock. In many places the present surface soil—yellowish-brown or brown friable loam—is a mixture of the original surface soil and the upper part of the subsoil. In some of the more severely eroded spots of this mapping unit, the present surface soil is reddish clay loam. The depth to bedrock varies from place to place but is generally 30 to 36 inches.

This soil is rather low in organic matter, and its natural fertility is low. It is permeable but the root zone is shallow. It is well aerated and has good moisture-holding and water-supplying capacity. It is easy to work and only moderately difficult to conserve.

Use and suitability (Capability unit IIIe-2).—Except for a few small scattered areas, this soil has all been cropped. It is now used chiefly for corn, small grains, and lespedeza. Small acreages of alfalfa and tobacco are also grown. About 30 percent is in unimproved pasture. This soil should not be cropped intensively, but all of the crops common to the county can be grown. If adequately fertilized, this soil gives satisfactory yields.

Christian loam, moderately steep phase (15 to 25 percent slopes) (Ce).—This soil has slightly thinner horizons and is slightly shallower to bedrock than Christian loam, eroded gently sloping phase. It occurs in small to medium-sized, irregular areas on the slopes of low ridges. It is associated with Tellico, Litz, and Barbourville soils.

This soil is low in organic matter. It is medium acid to strongly acid. Moisture infiltrates moderately rapidly, and supplies of available moisture are moderately high. Cultivated areas are likely to erode. Tilth is good. The natural fertility is low.

Use and suitability (Capability unit IVe-1).—Most of this soil is in cutover deciduous forest. Under exacting management, this soil is suitable for crops. Long rotations consisting chiefly of close-growing plants are required. If adequately fertilized and otherwise managed well, this soil produces moderately high yields.

Christian loam, eroded moderately steep phase (12 to 25 percent slopes) (Cf).—This soil occurs in medium-sized areas on the slopes of low ridges. It is somewhat shallower than Christian loam, eroded gently sloping phase, and has thinner soil horizons. Its 5- to 6-inch surface layer is yellowish-brown or brown friable loam. The subsoil is yellowish-red or red moderately friable clay loam. Except for a few shale or sandstone fragments, this soil is practically stone free. The depths to sandy shale bedrock are generally 24 to 30 inches, but in a few places the depth is as much as 4 or 5 feet. This soil is associated with Tellico, Litz, and Barbourville soils and with other Christian soils.

This soil is low in natural fertility. It is medium acid to strongly acid. The good tilth of the plow layer is easy to maintain. Although water infiltrates the upper part of the soil moderately rapidly, runoff develops quickly because of the moderately steep slopes. This soil is moderately difficult to conserve if it is cultivated or left without adequate cover.

Use and suitability (Capability unit IVe-1).—All of this soil has been cleared, and much of it is now used for corn, small grains, hay, and pasture. A large acreage is idle each year. If adequately fertilized, this soil produces good yields of close-growing crops and pasture. It is suited to row crops only if they are grown occasionally in long rotations. Practically all of the common crops can be grown. A high level of fertility must be maintained if alfalfa and other exacting crops are grown.

Christian clay loam, severely eroded sloping phase (5 to 12 percent slopes) (Ca).—This is a well-drained, moderately deep soil on upland slopes. It has developed from the weathered products of sandy shales that had

thin interbeds of limestone and sandstone. It has thinner layers and is shallower to bedrock than Christian clay loam, eroded gently sloping phase.

Accelerated erosion has removed most of the original surface layer. The present plow layer consists of remnants of the original surface soil mixed with the upper subsoil. The upper 6 inches is a yellowish-red friable clay loam. The underlying material is a red or yellowish-red friable clay loam or silty clay loam. A few shallow gullies occur in some areas, but most of them can be crossed with farm machinery. The average depth to the shaly bedrock is about 30 inches, but the depth is as little as 12 inches in a few spots.

This soil is not extensive. It occurs in small areas, usually less than 5 acres in size. It is associated with Tellico and Litz soils and with other Christian soils.

This soil is low in organic matter. It is medium acid to strongly acid. Tilth is poor because the surface soil is plastic when wet and hard when dry. Permeability is moderately slow; consequently, runoff develops quickly and is likely to cause erosion of unprotected soil. The natural fertility is low.

Use and suitability (Capability unit IVe-3).—Almost all of this soil has been cropped. Many areas are now idle or in unimproved pasture. A few areas are reverting to pine forest. A small acreage is used for corn, small grains, and hay. Average yields are low.

The use suitability of this soil is limited by poor moisture relations and the risk of further erosion. If properly managed, this soil is suited to long rotations of small grains and grass-and-legume hay or pasture. All of the common grasses and legumes are suitable. Because the supply of available moisture is low, yields are not generally high.

Christian clay loam, severely eroded moderately steep phase (12 to 25 percent slopes) (Cb).—Most of this soil occurs in small areas on slopes below the ridgetops occupied by undulating and rolling Christian soils. Because of the severe erosion, the 5- or 6-inch plow layer consists almost wholly of subsoil material—yellowish-red friable clay loam. Below depths of about 15 to 20 inches, there is a yellowish-red clay loam or sandy clay, variegated with yellowish brown. The sandy shale bedrock generally occurs at depths of 12 to 30 inches. Shallow gullies are common, and a few gullies that cannot be crossed with heavy farm machinery have formed.

The natural fertility of this soil is low. Tilth is poor and the water-supplying capacity is low.

Use and suitability (Capability unit IVe-3).—All of this soil has been cropped. A small part is now cropped, a small part is pastured, and a considerable acreage is either idle or is reverting to pine forest. This soil is poorly suited to crops. If adequately fertilized and otherwise well managed, most of the acreage could grow a good cover of the common grasses and legumes.

Colbert silty clay loam, eroded sloping phase (5 to 12 percent slopes) (Cg).—This is a very plastic, shallow soil of the uplands. It has developed in clayey limestone residuum. A considerable part of the original silt loam surface soil has been removed by erosion; consequently, the subsoil is exposed in places, and the plow layer consists partly of yellow plastic subsoil material.

This soil occurs in small areas, generally adjacent to larger areas of Rockland. It is also associated with the Talbott soils. It differs from the Talbott soils, which have a yellowish-red subsoil, in having a very heavy, plastic, yellow subsoil.

Profile description:

0 to 5 inches, grayish-brown or dark grayish-brown moderately friable silty clay loam; strong, fine and medium granular structure.

5 to 7 inches, dark yellowish-brown, mixed with grayish-brown, moderately friable silty clay loam; strong medium subangular blocky structure.

7 to 20 inches, yellowish-brown, very firm clay; strong coarse subangular blocky structure that is nearly massive.

20 inches +, yellowish-brown very firm clay; common, medium, distinct, strong-brown mottles; structureless (massive); very hard when dry; very plastic when wet.

The depths to bedrock range from 12 to 30 inches. Small, dark-colored or nearly black concretions are common in the upper subsoil. The more severely eroded areas have a clayey and plastic plow layer that is almost identical to the subsoil in the less severely eroded areas. The few bedrock outcrops do not make tillage impractical. Included are a few areas that have slopes of 12 to 25 percent.

This soil is about medium acid. It is moderately low in organic matter. The heavy subsoil retards the growth of plant roots. Air and moisture circulate rather slowly. The water-supplying capacity is low; consequently, plants are quickly affected by droughts. Tilth is poor and difficult to maintain. The fertility is moderately low. Cultivated areas are likely to erode.

Use and suitability (Capability unit IIIs-1.)—About 70 percent of this soil has been cleared and is used largely for unimproved pasture. A small part is in crops. The rest of this soil is in a forest of mixed hardwoods and redcedar.

Because of its firm plastic subsoil and shallow profile, this soil is not well suited to intertilled crops. Fairly good stands of the common pasture can be established if lime, fertilizer, and organic matter are applied. Pastures deteriorate quickly in dry weather, however, because the soil is droughty.

Cumberland silty clay loam, eroded gently sloping phase (2 to 5 percent slopes) (Cl).—This is a red, well-drained soil of the high stream terraces. Most of it is 50 to 125 feet above the present flood plains. It has developed in mixed alluvium that was derived mainly from limestone, or was strongly affected by limestone. The original vegetation was a forest of upland hardwoods.

Most of the acreage is on the high terraces along the Little River and the Tennessee River. It is associated with Waynesboro and Etowah soils and with other Cumberland soils. Individual areas are small and irregular in outline.

A great part of this soil has been materially eroded. Much of the plow layer is now a mixture of the clayey subsoil and the original silt loam surface soil.

Profile description:

0 to 7 inches, reddish-brown or dark reddish-brown friable silty clay loam; moderate medium granular structure.
7 to 14 inches, red friable silty clay loam; moderate fine subangular blocky structure.
14 to 44 inches, red to dark-red moderately friable silty clay, sandy clay, or clay; moderate medium subangular blocky structure.
44 to 60 inches, red moderately friable silty clay loam; moderate medium subangular blocky structure that is less distinct than in layer above; in places, lower part is lightly streaked or variegated with yellow and gray.

Almost all of this soil is underlain by limestone bedrock at depths of 5 to 20 feet. Cobblestones and gravel occur in a few places, but they are not numerous enough to interfere with cultivation. Small dark concretions are common throughout the subsoil. Included are areas where erosion has been less active than in the soil described. These inclusions have a silt loam surface soil, 8 to 10 inches thick.

Cumberland silty clay loam, eroded gently sloping phase, is one of the most fertile soils of the county. It contains a moderate amount of organic matter and is medium acid. It is permeable to roots, air, and moisture. Water is absorbed at a moderate rate, and the water-supplying capacity is relatively high. The favorable tilth and gentle slopes make this soil easy to work and conserve.

Use and suitability (Capability unit IIe-3).—Almost all of this soil has been cleared and is now used for general farm crops, chiefly corn and small grains, and for hay, alfalfa, red clover, lespedeza, and other legumes. Vegetables and tobacco are common cash crops.

This is one of the best soils in the county for general farm crops and pasture. It is very productive, easily worked and conserved, and suited to all the commonly grown crops. It responds well to good management. If its organic matter is maintained, it has a fairly high capacity for supplying moisture to plants. Because this soil is slightly erodible when cultivated, rotations of moderate length should be used. A 2- or 3-year rotation in which grasses and legumes are used about one-half the time is suitable. If adequately limed and well fertilized, especially with phosphate, this soil can grow excellent pasture. Orchardgrass, white clover or Ladino clover, lespedeza, red clover, alfalfa, and bluegrass produce pastures of high quality.

Cumberland silty clay loam, eroded sloping phase (5 to 12 percent slopes) (Cm).—This is a red, well-drained soil that occurs in medium-sized areas on high stream terraces. It is the most extensive Cumberland soil.

A great part of this mapping unit has been moderately eroded. The plow layer of more than half of the eroded acreage is a mixture of the original surface soil and subsoil. This layer is a reddish-brown friable silty clay loam or clay loam. It is underlain by red moderately friable silty clay or sandy clay subsoil. Practically all areas are underlain by limestone bedrock at depths of 5 to 20 feet. Included is a small acreage that is practically uneroded. This inclusion has a 7- or 8-inch surface layer of dark-brown silt loam.

This soil is medium acid to strongly acid. Its natural fertility is relatively high, although it is somewhat lower than that of Cumberland silty clay loam, eroded gently sloping phase. The soil is permeable to roots, air, and moisture. A few small areas have enough cobblestones and gravel to interfere with cultivation. These areas are denoted on the soil map by the appropriate symbol. Most of the acreage, however, is practically free of stones and is easy to work and moderately easy to conserve.

Use and suitability (Capability unit IIIe-3).—Practically all of this soil is used for crops. Commonly grown are corn, small grains, and, for hay, alfalfa, timothy, red clover, and lespedeza. Tobacco is an important cash crop, but it is grown less extensively than on Cumberland silty clay loam, eroded gently sloping phase. Very little of this soil is idle.

This soil is suited to practically all the crops of the area. It has good capacity for holding moisture and releasing it to plants. It is not so easy to work and to conserve as Cumberland silty clay loam, eroded gently sloping phase, and it requires somewhat longer rotations. A suitable rotation consists of a row crop, a small grain crop, and grass-legume hay or pasture for 1 or 2 years. Pastures are good if adequately fertilized and otherwise well managed.

Cumberland silty clay loam, eroded moderately steep phase (12 to 25 percent slopes) (Cn).—This is a red, well-drained soil that occurs on high stream terraces, mostly along the Little River and the Tennessee River in the Cumberland-Etowah-Emory soil association. The parent material was mixed general alluvium that was derived mainly from limestone or was strongly affected by limestone. This soil has somewhat more rapid runoff than has Cumberland silty clay loam, eroded gently sloping phase, and, in most areas, has lost more of its original surface soil. Generally, it is more variable in color, depth, and texture. The 5- or 6-inch plow layer is dark-brown or reddish-brown friable silty clay loam. The subsoil is dark-red moderately friable silty clay. Included are a few areas that have a friable silt loam surface soil about 8 inches thick.

This soil is fertile. Its surface soil contains a moderate amount of organic matter. It is about medium acid. It is permeable to roots, air, and water. Gravel and cobblestones on the surface of a few areas interfere with tillage. These areas are denoted on the soil map by appropriate symbols. Except for these areas and a few spots where the subsoil is exposed, this soil has good tilth and is fairly easy to work.

Use and suitability (Capability unit IVe-2).—Most of this soil has been cropped. About 50 percent is now used for tilled crops, and most of the rest is in pasture. A very small part is idle.

This soil is moderately well suited to tilled crops, but it needs more exacting management than Cumberland silty clay loam, eroded gently sloping phase. It needs to be protected against further erosion. Tillage should be on the contour. Rotations should be longer and should include more close-growing crops and more leguminous green-manure crops. The steeper and more severely eroded areas are better suited to hay crops or

permanent pasture than to tilled crops. Practically all the common pasture plants can be grown.

Cumberland silty clay, severely eroded sloping phase (5 to 12 percent slopes) (Ch).—This soil is scattered in small areas on high terraces along the Little River and the Tennessee River. It is Cumberland silt loam from which almost all of the surface soil and, in places, part of the subsoil have been removed by erosion. Cumberland silt loam is not mapped separately in this county. The plow layer consists of red moderately friable silty clay similar to the subsoil. Small shallow gullies are common, but practically all of them can be obliterated by tillage. The gravel and cobblestones that occur in a few places are not numerous enough to prevent tillage. Gravelly or stony spots are denoted on the soil map by the appropriate symbol.

In some included areas the profile contains notable amounts of sand. The plow layer in these spots is more like clay loam than silty clay.

This soil contains little organic matter. It is medium to strongly acid. The supply of mineral plant nutrients is relatively high. Because the plow layer is clayey, tilth is poor and the infiltration of water is fairly slow.

Use and suitability (Capability unit IVe-4).—All of this soil has been cleared and cropped. A large part is now idle or is in unimproved pasture consisting mainly of lespedeza and volunteer plants. A few areas are used for cultivated crops, chiefly corn. A small grain generally follows the corn in a rotation. Very small areas of this soil are used with other soils in a field, and they are not specially managed.

This soil is poorly suited to crops. Large applications of organic matter, lime, and mineral fertilizer are needed to increase fertility, improve tilth, and increase the capacity of the soil to absorb moisture and supply it to plants. Long rotations that consist chiefly of close-growing crops are needed to control runoff. If properly managed this soil will produce high yields of white clover, Ladino clover, alfalfa, red clover, orchardgrass, timothy, and fescue. It is suited to all of the common pasture and hay plants.

Cumberland silty clay, severely eroded moderately steep phase (12 to 25 percent slopes) (Ck).—This soil is scattered in small areas on the high terraces along the Little River and the Tennessee River. It has a more clayey surface soil than Cumberland silty clay loam, eroded gently sloping phase. Almost all of the original surface soil and, in places, part of the subsoil have been lost through erosion.

The plow layer is red moderately friable silty clay, which is plastic when wet and moderately hard when dry. The underlying material is similar. Most of the shallow gullies in this soil can be crossed with heavy farm machinery and can be obliterated by tillage. Gravel and cobblestones are numerous in a few areas. These areas are denoted on the soil map by the appropriate symbol. In a few areas the surface soil is more like clay loam than silty clay.

This soil is less fertile than Cumberland soils that are not so severely eroded. It contains a small amount of organic matter and is medium acid. It is permeable to roots, but the infiltration of water is slow enough that runoff is heavy during rains. Workability and tilth are rather poor.

Use and suitability (Capability unit IVe-4).—All of this soil has been cleared of its native hardwoods and used for crops and pasture. A part is now idle. About 50 percent is used for pasture, much of which is unimproved. About 30 percent is used for common field crops, chiefly corn, small grains, and lespedeza for hay.

This soil is poorly suited to tilled crops, but they can be used in long rotations. It is difficult to work and conserve, and its productivity is low. It is probably best suited to semipermanent meadow or permanent pasture. If it is adequately fertilized and otherwise well managed, a good stand of orchardgrass, white clover, Ladino clover, fescue, and other pasture plants can be developed.

Dandridge silt loam, sloping phase (5 to 12 percent slopes) (Dd).—This soil is light colored, shaly, and shallow to calcareous shale bedrock. It occurs in highly dissected landscapes characterized by knobs of shale or black slate. Most of it is on narrow winding ridge crests that are flanked by hilly and steep areas of Dandridge soils. Practically all areas are in the Dandridge-Whitesburg-Hamblen soil association, just north of Chilhowee Mountain.

Profile description:

0 to 7 inches, yellowish-brown moderately friable heavy silt loam; strong medium granular structure; many hard and soft shale fragments.

7 to 17 inches, yellowish-brown firm silty clay loam soil material mixed with leached, partially leached, and unleached shale fragments; calcareous shale bedrock at a depth of 17 inches in some places.

The soil layers vary in thickness from place to place. The surface layer is thicker in areas still under forest and relatively uneroded. On sharp ridge crests and in severely eroded areas, the shaly bedrock is at or near the surface. On some of the broader smoother ridgetops or other smooth areas, the soil is somewhat deeper to bedrock and the subsoil may be yellow or reddish yellow. In the many places where the bedrock contains lenses of sandy shale, the overlying soil is almost like loam.

This soil is generally slightly acid to neutral. It is medium acid in spots where the shale bedrock is leached of lime to some depth. It contains little organic matter and is low in natural fertility. The less severely eroded areas have good tilth, but the more severely eroded have poor tilth because of the shale fragments, outcrops of bedrock, shallowness, and the fine texture of the soil material. This soil has low moisture-supplying capacity and is very droughty.

Use and suitability (Capability unit IIIs-1).—About 30 percent of this soil is still in forest. The cleared soil is used mainly for pastures, but some areas are used for crops, chiefly corn, small grains, and lespedeza hay. Most of the pastures are unimproved.

This soil can be used for tilled crops, but yields are normally low. It is not well suited to truck crops and late-maturing crops, because of droughtiness. If the soil is adequately fertilized, especially with phosphate and nitrogen, and otherwise well managed, it will produce fair pasture and hay. It is suited to all the com-

mon hay and pasture plants, but it is best suited to those that mature early.

Dandridge silt loam, moderately steep phase (12 to 25 percent slopes) (De).—This soil is widely distributed throughout the Dandridge-Whitesburg-Hamblen soil association. Most of it is on ridge slopes between the less steep Dandridge soils that are on the ridge crests and the Whitesburg or Hamblen soils that are in the draws and on the bottom lands.

In cultivated areas, the plow layer is yellowish-brown heavy silt loam that contains small shale fragments. Beneath this layer is yellowish-brown shaly silty clay loam. In forested areas, the surface soil is yellowish-brown moderately friable silt loam about 7 or 8 inches thick.

The calcareous shale bedrock is at depths ranging from 6 to 12 inches. In places where the bedrock contains lenses of sandstone or sandy shale, the profile contains a little more sand than the soil described and the texture is more like loam. In some cleared areas the plow layer is silty clay loam.

This soil is low in organic matter. Most of it is slightly acid to neutral, but spots where the bedrock is leached of lime to a considerable depth are medium acid. The water-supplying capacity is low because the soil is shallow. Fertility is moderate.

Use and suitability (Capability unit IVs-1).—About 65 percent of this soil has been cleared of its native hardwood forest. Much of the cleared acreage is now in unimproved pasture, some is used for crops, and a significant acreage is idle.

This soil is poorly suited to cultivated crops. It can be used for small grains and hay but is better suited to pasture. If adequately fertilized and otherwise well managed, this soil can produce good grass-and-legume pasture. Practically all of the common pasture and hay plants can be grown. Those that mature early are best.

Dandridge silt loam, steep phase (25 to 50 percent slopes) (Df).—This is a light-colored soil that is shallow to calcareous shale bedrock. It occurs in a highly dissected hilly to steep belt that is parallel with and just north of the Chilhowee Mountain range. This belt crosses the county in a southwest-northeast direction and becomes broader toward the east.

Profile description:

0 to 6 inches, yellowish-brown moderately friable silt loam; strong medium granular structure; many soft and hard shale fragments in places.
6 to 15 inches, yellowish-brown moderately firm shaly silty clay loam.

The calcareous shale bedrock occurs at depths of 8 to 20 inches. In places the subsoil is reddish or yellowish. Shaly material outcrops in spots. In some areas, the bedrock is slightly sandy and the profile contains some sand. These more sandy areas generally occur in a higher lying landscape that has knobs of shale or slate. In some places the shale bedrock has been leached of lime to depths of 2 to 3 feet; in other areas the soil is more acid.

This soil has a low water-supplying capacity because it is shallow to bedrock. It is generally less droughty on north-facing slopes than it is on slopes facing south. Natural fertility is low. The soil is generally slightly acid to neutral, depending on the depth to the calcareous rock.

Use and suitability (Capability unit VIs-1).—About 60 percent of this soil has been cleared and cropped. The rest is in a cutover hardwood forest. A large part of the cleared acreage is now in unimproved pasture, chiefly lespedeza and some volunteer plants. About 10 percent of the cleared area is cultivated and about 10 percent is idle.

This soil is very poorly suited to tilled crops. It is probably best suited to permanent pasture or forest. Pastures dry up quickly during droughts. They provide grazing only during the more moist periods, mainly spring and early summer. Among the pasture plants best suited to this soil are bluegrass, ryegrass, fescue, whiteclover, and lespedeza.

Dandridge shaly silty clay loam, eroded moderately steep phase (12 to 25 percent slopes) (Db).—This soil is light colored, shaly, and very shallow to calcareous shale bedrock. Because of erosion, it is much shallower than Dandridge silt loam, sloping phase. Its surface layer of yellowish-brown or grayish-brown shaly silty clay loam overlies shale bedrock at depths ranging from a few inches to 1 foot. In many places the shale is exposed. Shallow gullies that can be crossed with heavy machinery are common, but the gullied areas are difficult to reclaim because there is not enough soil for fill.

This soil is associated with less steep Dandridge soils that occur on ridges above it. Most of the acreage is in the Dandridge-Whitesburg-Hamblen soil association.

Use and suitability (Capability unit IVs-1).—All of this soil has been cleared and cropped. A large part is now idle or in unimproved pasture. Several areas have reverted to trees, chiefly cedars.

This soil is not suited to cultivated crops, but it can be used in long rotations. It is very difficult to work and to conserve. Its capacity to supply water is low, and response of plants to fertilizer is very low. Fair pastures can be established, but yields will be low. Forestry probably is the best use for some areas.

Dandridge shaly silty clay loam, eroded steep phase (25 to 50 percent slopes) (Dc).—This soil is light colored, shaly, and very shallow to calcareous shale bedrock. All or practically all of its surface soil has been lost through erosion, and shallow gullies have formed. The upper 5 or 6 inches is a yellowish-brown or grayish-brown silty clay loam or silty clay that contains a high proportion of shale fragments. The depth to bedrock generally ranges from a few inches to about 1 foot, but in many places the shaly bedrock is at the surface. There is so little soil material that it is hard to fill in even the shallow gullies. In most places the upper part of the bedrock can easily be broken by the heavier tillage implements. Areas of this soil are scattered thinly throughout the Dandridge-Whitesburg-Hamblen soil association.

This soil is extremely droughty. It contains ample lime in most places because the calcareous bedrock is at or near the surface.

Use and suitability (Capability unit VIs-1).—All of this soil has been cleared and cropped. Most of it is now used as unimproved pasture; a large part is idle. Some areas have reverted to trees, chiefly cedar, Virginia pine, sassafras, persimmon, and redbud. This soil is not suited to tilled crops. It is only poorly suited to pasture. It is probably best suited to forest.

Dandridge shaly silt loam, very steep phase (50+ percent slopes) (Da).—This soil is light colored, shaly, and very shallow to calcareous shale bedrock. The surface soil is yellowish-brown or grayish-brown shaly silt loam about 6 inches thick. The bedrock generally is at depths ranging from 6 to 15 inches, but bedrock outcrops in many places. Practically all areas are in the Dandridge-Whitesburg-Hamblen soil association, which occurs in the southern part of the Great Valley portion of the county.

In a few places the bedrock is leached of lime to depths of 2 to 3 feet. In places the bedrock is sandy and the overlying soil contains more sand than the typical soil. These included areas are probably more like the Litz series than the Dandridge series. They could not be mapped separately because of the complex pattern of distribution.

Use and suitability (Capability unit VIs-1).—Practically all of this soil is still in forest. The forest stand is thin because of overcutting and burning. This soil is not suited to crops or pasture. It is best suited to forest.

Decatur silty clay loam, eroded gently sloping phase (2 to 5 percent slopes) (Dk).—This deep, well-drained, reddish soil occurs on relatively smooth uplands in valleys that extend in a southwest-northeast direction through the county. It has developed from high-grade dolomitic limestone under a deciduous forest. Most of it is in the Dewey-Decatur-Dunmore soil association. This soil is associated with other soils of the Decatur series and with Dewey, Hermitage, and Emory soils.

Profile description:

0 to 7 inches, dark reddish-brown or dark-brown friable silty clay loam; moderate to strong medium granular structure.
7 to 14 inches, dark reddish-brown moderately firm silty clay loam or silty clay; moderate fine subangular blocky structure.
14 to 20 inches, dark-red firm clay or silty clay; strong medium subangular blocky structure.
20 to 42 inches, dark-red firm clay or silty clay; strong medium subangular blocky structure.
42 to 60 inches +, red to dark-red firm silty clay or clay; strong medium subangular blocky structure; contains a few brownish-yellow variegations, which are more numerous in lower part.

The depth to the limestone bedrock ranges from 6 to 18 feet. On some of the less eroded areas, the surface soil is thicker and more like a silt loam. Included are a few spots that have a surface soil of red firm silty clay.

This soil is relatively high in natural fertility. Its surface layer contains a moderate amount of organic matter. The internal drainage is moderate, but the firm subsoil retards the rate at which moisture is absorbed. Consequently, runoff water accumulates rather quickly during rains. The moisture-holding capacity is moderate. It is less than that of the Emory, Hermitage, and other soils on the local alluvial slopes. The reaction is medium acid to strongly acid.

Use and suitability (Capability unit IIe-3).—All of this soil has been cleared and cultivated, and a great part is now used for crops. Corn, lespedeza, and alfalfa are the main crops. Small grains and pasture are important. Some acreage is used for tobacco and vegetables. Moderately short rotations are usual. Some fertilizer is used, and much of the acreage has been limed. Crop yields are high.

This is one of the best soils in the county for crops and pasture. It is especially well suited to the general farm crops, including alfalfa, red clover, orchardgrass, and other exacting legumes and grasses. This soil responds well to fertilizer. Legume crops require lime, and alfalfa requires boron as well. Runoff should be controlled in eroded areas that are cultivated.

Decatur silty clay loam, eroded sloping phase (5 to 12 percent slopes) (Dl).—This soil contains slightly more clay and is slightly shallower than Decatur silty clay loam, eroded gently sloping phase, and has more spots that are severely eroded. The 5-inch surface layer is brown to dark reddish-brown moderately friable silty clay loam. To a depth of about 32 inches the subsoil is red or dark-red firm silty clay. Depth to the limestone bedrock ranges from 5 to 15 feet.

This soil is fertile. Except in the more severely eroded parts, it is fairly high in organic matter. It is medium acid to strongly acid. The internal drainage is moderate, but the firm subsoil retards percolation. This soil is permeable enough, however, to allow normal development of roots. The moisture-supplying capacity is moderate, but this soil is somewhat more droughty than the Emory and Hermitage soils.

Most of this soil is in the Dewey-Decatur-Dunmore soil association.

Use and suitability (Capability unit IIIe-3).—All of this soil has been cleared and cropped. About 20 percent is in permanent pasture. The rest is used for crops, mainly corn, alfalfa, red clover, oats, wheat, and other small grains. Moderately short rotations are used. Some of the soil is fertilized, and much of it is limed.

This soil is well suited to general crops. It is particularly well suited to pasture of alfalfa, red clover, and other of the more exacting legumes and grasses. It is less well suited to truck crops. The quality of tobacco grown on this soil is probably not so high as it is on some of the well-drained lighter colored soils.

Decatur silty clay loam, eroded moderately steep phase (12 to 15 percent slopes) (Dm).—The surface layer of this soil consists of a mixture of the subsoil and the original surface soil. It is brown to dark-brown friable silty clay loam. To a depth of about 30 inches, the subsoil is red to dark-red firm clay or silty clay. Next is a layer of red firm to very firm silty clay or clay that is slightly lighter colored than the layer above. The depth to limestone bedrock ranges from 4 to 13 feet. In a few places there are shallow gullies, most of which can be obliterated by deep tillage or by filling. Included are some spots that have a plow layer of subsoil material—red firm silty clay.

This soil is fertile. Except where erosion has removed most of the surface layer, it contains a moderate amount of organic matter. It is medium acid to strongly acid. The permeability to roots is moderate. Runoff develops quickly because of the firm subsoil. The water-supplying capacity is medium.

Almost all of this soil is in the Dewey-Decatur-Dunmore soil association. Much of it is in small strips on the short, strong slopes below less steep areas of Decatur and Dewey soils.

Use and suitability (Capability unit IVe-2).—Nearly all of this soil has been cropped. Much of it is now used for pasture, but some is used for general crops, especially alfalfa and small grains. Some fertilizer is used, and much of the acreage has been limed.

This soil is poorly suited to intensive use. It is poorly suited to truck crops, particularly root crops. It is well suited to legumes and grass for hay and pasture and to small grains. Long rotations should be used.

Decatur silty clay, severely eroded sloping phase (5 to 12 percent slopes) (Dg).—This soil has lost almost all of its original surface soil and, in places, part of its subsoil. Some shallow gullies occur. The plow layer is red to dark-red firm silty clay. The subsoil is similar to the plow layer except that it is lighter colored below a depth of 30 inches. Limestone bedrock occurs at depths of 3 to 12 feet.

Most of this soil occurs in small tracts in association with the less severely eroded Decatur soils. Almost all of it is in the Dewey-Decatur-Dunmore soil association.

The plow layer of this soil has poor tilth. Moisture infiltrates rather slowly, but the soil is fairly permeable to roots. This soil contains small amounts of organic matter and plant nutrients, but it responds well to fertilizer. It is medium acid to strongly acid. The risk of further erosion is high in cultivated areas.

Use and suitability (Capability unit IVe-4).—All of this soil has been cropped. Much of it is now used for pasture. A small acreage is in hay and corn. Yields are low. Some areas are moderately fertilized and some are limed.

If this soil is properly fertilized and limed, it can be used for crops in long rotations. It is suited to small grains and legume-and-grass hay. Alfalfa, red clover, orchardgrass, timothy, and other exacting legumes and grasses can be grown. If well managed, this soil is suited to pasture. It is too droughty for shallow-rooted plants.

Decatur silty clay, severely eroded moderately steep phase (12 to 25 percent slopes) (Dh).—This soil has lost almost all of the original surface soil and, in places, part of the subsoil. The plow layer is red to dark-red firm silty clay. The subsoil consists of similar material except that it becomes lighter red with increasing depth. Limestone bedrock occurs at depths of 3 to 12 feet. Most of the gullies that have formed can be obliterated by deep tillage or by filling.

This soil contains a small amount of organic matter and plant nutrients. Its tilth is poor. Moisture percolates slowly, and the moisture-supplying capacity is low.

Use and suitability (Capability unit IVe-4).—All of this soil has been cropped. Much of it is used for pasture. A small acreage is used for small grains and corn. Yields are not high.

This soil is poorly suited to crops. If properly fertilized and limed, it will support legume-and-grass pastures of high quality. The pastures, however, are quickly damaged by dry weather.

Dewey silty clay loam, eroded gently sloping phase (2 to 5 percent slopes) (Ds).—This soil of the uplands is deep and well drained. It developed from the weathered products of high-grade dolomitic limestone. Most of it lies on the rounded crests of low ridges in the limestone valleys. It differs from the Decatur soils chiefly in having a lighter brown surface soil and a lighter red subsoil, and in being a little less fertile. Its deep subsoil commonly contains a small quantity of fine chert fragments. This soil is distributed throughout the Dewey-Decatur-Dunmore soil association.

Profile description:

0 to 7 inches, brown to dark-brown friable silty clay loam; moderate medium granular structure.
7 to 11 inches, yellowish-red friable silty clay loam; moderate and strong fine subangular blocky structure.
11 to 17 inches, red firm silty clay; moderate to strong medium subangular blocky structure.
17 to 44 inches, red firm silty clay or clay; strong medium subangular blocky structure.
44 to 60 inches, red or yellowish-red firm clay or silty clay; structure less distinct than in layer above and individual aggregates are larger; few yellowish-brown variegations that are more numerous in lower portion; few finely divided chert fragments.

The depth to the limestone bedrock ranges from 7 to 20 feet. In a few spots the red firm subsoil is exposed. The surface layer has a reddish tinge in places. In many cultivated areas small amounts of subsoil material have been mixed with the surface soil.

Included are a few areas in which the surface soil is almost like loam. The profile in these areas is somewhat sandy and the bedrock is probably sandy limestone or limestone that contains thin lenses of sand. Because of the intricate pattern of distribution, it was not practical to delineate these areas separately.

This soil contains a moderate amount of organic matter, but less than Decatur silty clay loam, eroded gently sloping phase. The reaction is medium acid to strongly acid, and the natural fertility is relatively high. Internal drainage is good, but the infiltration of water is somewhat impeded by the firm clayey subsoil. This soil is permeable to roots. It has a moderately high water-supplying capacity. It absorbs large quantities of water, but, apparently because it contains so much clay, much of the water is tightly held and is unavailable to plants.

Use and suitability (Capability unit IIe-3).—Nearly all of this soil has been cropped for many years. About 35 or 40 percent is now used for crops, chiefly corn and small grains; 35 percent is used for hay, mainly lespedeza, alfalfa, and timothy; and 20 percent is used for pasture. The rest is idle or in native hardwood forest.

This soil is well suited to almost all crops commonly grown in the county. It is well suited to tobacco and most truck crops. Plants respond well to fertilization and other good management. Bluegrass, white clover,

Ladino clover, alfalfa, red clover, and other exacting plants grow well if the fertility is maintained.

Dewey silty clay loam, eroded sloping phase (5 to 12 percent slopes) (Dt).—This extensive soil is scattered widely throughout the limestone valleys. It has lost slightly more of its original surface soil than Dewey silty clay loam, eroded gently sloping phase, and slightly more subsoil material is mixed in the plow layer. Small spots where the red clay subsoil is exposed are more common.

The plow layer is now brown to reddish-brown moderately friable silty clay loam. The subsoil is red, firm silty clay loam, silty clay, or clay. Below depths of 35 to 40 inches the material is red firm clay or silty clay, streaked or variegated with yellowish brown and brownish yellow. In places small amounts of fine chert fragments occur through the profile, especially in the lower subsoil. The limestone bedrock is at depths of 7 to 18 feet.

Included is a small acreage in which the profile is sandy throughout and the surface soil is almost like loam in texture. This inclusion apparently has developed from sandy limestone or limestone that has thin lenses of sandstone.

This relatively fertile soil contains a moderate amount of organic matter. It is medium acid to strongly acid. It is permeable to roots, but the heavy subsoil retards the percolation of water, and runoff develops quickly during heavy rains. The erosion hazard is high in cultivated areas. This soil apparently absorbs large quantities of water, much of which is held tightly by the soil and is difficulty for plants to obtain. The tilth is good and the workability is generally good.

Use and suitability (Capability unit IIIe-3).—Almost all of this soil has been cropped. Corn and hay—chiefly lespedeza and alfalfa—are the main crops. About 25 percent of this soil is used for pasture. A small acreage is in tobacco.

This is one of the best soils in the county for crops, but it needs more exacting management than Dewey silty clay loam, eroded gently sloping phase. If adequately fertilized, this soil will give good yields of alfalfa, red clover, white clover, Ladino clover, orchardgrass, timothy, and bluegrass.

Dewey silty clay loam, eroded moderately steep phase (12 to 25 percent slopes) (Du).—This well-drained soil is widely distributed on the three major dolomitic limestone formations which cross the county in a northwest-southeast direction. Much of it lies in narrow strips on strong slopes in the upland part of the valleys. This soil is somewhat more eroded than Dewey silty clay loam, eroded gently sloping phase.

The plow layer now consists of brown or reddish-brown silty clay loam, and the subsoil is red firm silty clay loam to silty clay. Below a depth of about 30 inches is a layer of lighter red friable silty clay, streaked and splotched with yellow. The limestone bedrock occurs at depths of 5 to 16 feet. Many areas have a little fine chert throughout the profile, mostly in the lower subsoil.

A few areas have a small amount of fine sand in the profile, especially in the surface soil. These areas appear to have developed on limestone that contains lenses of sandstone. Some small exposed spots have lost all their original surface soil and now have a plow layer of red firm silty clay.

Except in the more severely eroded areas, this soil is moderately high in fertility and contains a moderate amount of organic matter. It is medium acid to strongly acid. It is permeable to roots. The surface soil is permeable to moisture, but the subsoil somewhat retards percolation. Cultivated areas are likely to erode.

Use and suitability (Capability unit IVe-2).—Most of this soil has been cultivated. Much of it is now used for hay and pasture, to which it is suited if properly fertilized. This soil is of limited use for cultivated crops because it is erodible and hard to till. It should be used for long rotations that consist mostly of small grains, hay, and pasture.

Dewey silt loam, sloping phase (5 to 12 percent slopes) (Dn).—This soil occurs on the rolling tops and smoother slopes of the low ridges and hills in the limestone valleys. It has a thicker surface soil than Dewey silty clay loam, eroded gently sloping phase. Most of it is under native forest and is relatively uneroded.

The surface layer is brown or dark-brown friable silt loam about 8 inches thick. The subsoil is red firm silty clay or clay. Below a depth of about 40 inches the material is red silty clay or clay, streaked or variegated with yellowish brown and brownish yellow. A small amount of fine chert occurs throughout most of the profile, especially in the lower subsoil. The limestone bedrock is at depths of 7 to 18 feet.

This fertile soil contains a moderately high amount of organic matter. It is medium acid to strongly acid. It is permeable to roots. The surface soil absorbs water rapidly, but the heavy subsoil retards percolation. Runoff begins more quickly than on more friable permeable soils. The water-holding capacity is medium. The tilth and the workability are good.

Included are a few acres that have considerable amounts of sand throughout the profile, especially in the upper part. The surface soil of these areas is almost like loam in texture.

Use and suitability (Capability unit IIIe-3).—Most areas of this soil are still in native deciduous forest. The cleared areas are used for general crops and pasture. Very little of this soil is idle.

This soil is well suited to general farming if fairly long rotations are used. It is especially well suited to grasses and legumes. If properly fertilized and limed, it will produce good stands of alfalfa, red clover, white clover, Ladino clover, orchardgrass, timothy, and bluegrass. All common row crops are well suited to this soil if grown in suitable rotations.

Dewey silt loam, moderately steep phase (12 to 25 percent slopes) (Do).—This deep, well-drained, red soil of the uplands developed in high-grade dolomitic limestone residuum. It has somewhat thinner soil layers than Dewey silty clay loam, eroded sloping phase, and is slightly shallower to bedrock.

The surface layer is brown or dark-brown friable silt loam. The subsoil is red firm silty clay loam or silty clay. Below depths of about 30 to 36 inches is a

layer of somewhat lighter red firm clay or silty clay, streaked or variegated with yellow or yellowish brown. A small amount of fine chert is common in the lower part of this soil. The limestone bedrock occurs at depths of 5 to 16 feet. This soil is scattered throughout the Dewey-Decatur-Dunmore soil association.

Included are a few areas in which the profile is sandy throughout, especially in the surface soil. These inclusions have a loam surface soil.

This soil is moderately high in organic matter. It is medium acid to strongly acid. The fertility is moderately high. Water penetrates the surface soil rapidly, but the clay in the subsoil slows penetration. This soil is permeable to roots.

Use and suitability (Capability unit IVe-2).—Practically all of this soil is still in a deciduous forest that has been cut over several times. The cleared spots are used for general crops and pasture. This soil is suited to crops and pasture, but tilled crops should be grown only in long rotations that consist chiefly of close-growing crops. If this soil is fertilized and otherwise well managed, it is suited to alfalfa, white clover, Ladino clover, red clover, orchardgrass, timothy, and bluegrass.

Dewey silty clay, severely eroded sloping phase (5 to 12 percent slopes) (Dp).—This well-drained deep soil is scattered in small areas on the uplands. It has developed from high-grade dolomitic limestone. The plow layer is red or yellowish-red firm silty clay. It is underlain by similar material that contains some fine chert fragments and grades with depth to a lighter red. The limestone bedrock occurs at depths of 5 to 16 feet. Most of the few shallow gullies can be crossed with heavy farm machinery and can be obliterated by deep tillage.

This soil is low in fertility. It contains little organic matter. It is medium acid to strongly acid. The tilth of the plow layer is very poor. The absorption of water is slow, and the capacity to supply water to plants is low. Runoff develops quickly. Although water percolates slowly, this soil is fairly permeable to roots.

Use and suitability (Capability unit IVe-4).—All of this soil has been cropped. Much of it is now idle or in unimproved pasture. Some is used for crops, chiefly small grains, corn, and hay. This soil is fairly well suited to crops and pasture if properly managed. It is suited to alfalfa and other deep-rooted legumes if the fertility is raised to a moderately high level. Much of the acreage probably can well be used for permanent pasture. This soil does not supply enough water to pasture plants for the pasture to be grazed late in summer or early in fall.

Dewey silty clay, severely eroded moderately steep phase (12 to 25 percent slopes) (Dr).—The areas of this soil were once areas of Dewey silt loam, moderately steep phase, but they have lost practically all of the original surface soil and, in places, part of the subsoil.

This soil now has a plow layer of yellowish-red or red firm silty clay. The upper subsoil is similar to the surface layer. Below a depth of about 30 inches, lighter red silty clay is streaked or splotched with yellow. The limestone bedrock occurs at depths of 4 to 15 feet. In many places the profile, particularly the lower subsoil, contains a little fine chert. Most of the shallow gullies that have formed in some places can be obliterated by deep tillage or by filling. This soil is widely distributed throughout the Dewey-Decatur-Dunmore soil association.

This soil has poor tilth and absorbs moisture slowly. Its water-supplying capacity is low. It contains little organic matter, and its fertility is low. It is medium acid to strongly acid. Although moisture percolates slowly, this soil is fairly permeable to roots.

Use and suitability (Capability unit IVe-4).—All of this soil has been cropped. Much of it is now idle or in unimproved pasture. Only a small part is used for crops, mainly small grains and lespedeza. This soil is poorly suited to tilled crops. If properly fertilized and limed, it will support good pastures of legumes and grasses. Because it is droughty late in summer and early in fall, pasture plants grow very little during this period.

Dunmore silty clay loam, eroded gently sloping phase (2 to 5 percent slopes) (Daa).—This deep, well-drained soil of the uplands has developed over clayey dolomitic limestone. It generally occurs on the gently sloping crests of low-lying rounded hills and ridges. Much of it occurs in the southernmost part of the three limestone belts that pass through the county.

This soil is associated with other Dunmore soils and with the Dewey, Emory, Pace, Minvale, and Lindside soils. Its surface soil is lighter colored than that of the Dewey soils, and its subsoil is lighter red and finer in texture. It differs from the Fullerton soils chiefly in having thinner horizons, less chert throughout the profile, and a more clayey subsoil.

Profile description:

0 to 7 inches, brown or yellowish-brown friable silty clay loam; moderate medium granular structure.
7 to 12 inches, yellowish-red firm silty clay to heavy silty clay loam; strong medium subangular blocky structure.
12 to 27 inches, yellowish-red very firm clay; strong coarse subangular blocky structure.
27 to 50 inches +, yellowish-red very firm clay or silty clay; common, fine, distinct brownish-yellow variegations; moderate coarse subangular blocky structure.

The depth to the limestone bedrock ranges from 3 to 10 feet. In a few places, bedrock outcrops. Some areas have fine pieces of chert on the surface. In a few spots the surface soil is yellowish red.

Included with this soil are a few areas having a surface soil that is nearly loam in texture. These inclusions apparently developed from sandy limestone or limestone containing lenses of sandstone. The sand, however, appears to have affected only the surface soil, except in a very few places in which the subsoil is clay loam and is more friable than the typical subsoil. Other inclusions are small spots of yellowish-red silty clay and a small eroded acreage of silt loam.

This soil is strongly acid, low in organic matter, and moderately low in natural fertility. The surface soil is very permeable to air, moisture, and roots, but the clayey subsoil retards the movement of air and moisture. Plant roots can penetrate the subsoil, although not so rapidly as they penetrate more permeable subsoils. This soil is easy to work with heavy farm

machinery. Its tilth is good and not difficult to maintain.

Use and suitability (Capability unit IIe-3).—About 85 percent of this soil has been cleared and, except for a small idle acreage, is used for the commonly grown crops, chiefly corn and small grains, and alfalfa, orchardgrass, and lespedeza for hay and pasture. This soil is especially well suited to alfalfa and other deep-rooted legumes. It is not so well suited to vegetables, especially deep-rooted ones, as the more friable soils. If adequately fertilized and otherwise well managed, it will support good pasture.

Dunmore silty clay loam, eroded sloping phase (5 to 12 percent slopes) (Dab).—This deep, well-drained upland soil developed from the weathered products of dolomitic limestone. It is widely distributed throughout the three major dolomitic limestone belts that pass through the Great Valley portion of the county. Much of it is east of the Little River. A small acreage is in Tuckaleechee Cove and Millers Cove.

The 6- or 7-inch plow layer is yellowish-brown or brown moderately friable silty clay loam. The subsoil is yellowish-red very firm clay. The depth to the limestone bedrock generally ranges from 3 to 10 feet.

Included are a few small spots where the subsoil is exposed and the surface layer is yellowish-red silty clay. In many of the less strongly sloping areas, the surface layer is almost like silt loam in texture. In a few areas, the profile is sandier than the profile described and the surface layer is almost like loam in texture. These areas normally occur as narrow elongated streaks that are difficult to map. They were apparently derived from lenses of sandstone in the bedrock.

This soil is closely associated with the Dewey, Fullerton, Minvale, Pace, and Greenvale soils.

This soil is about the same in natural fertility, content of organic matter, and acidity as Dunmore silt loam, sloping phase, but the tilth is poorer. Because of the fine texture and slope, runoff is rapid during heavy rains. Internal drainage, however, is adequate. Roots can penetrate the entire depth of this soil, but much more slowly than they penetrate more friable soils. This soil absorbs much water, but apparently a large part of the water is held by the clayey subsoil and is not available to plants. This soil is practically stone free, but a few outcrops of bedrock occur, and there is a little fine chert on the surface in a few areas.

Use and suitability (Capability unit IIIe-3).—All of this soil is used for general crops and pasture. Corn is the chief row crop; lespedeza, alfalfa, and red clover are the main hay crops. Small grains are grown, and tobacco is an important cash crop.

This soil is well suited to a wide variety of crops and pasture plants. It is especially well suited to alfalfa and other deep-rooted legumes. A suitable 3- or 4-year rotation consists of a row crop, a small grain, and a legume-and-grass mixture for hay and pasture. Good yields of tobacco and truck crops are obtained in many places, but these crops grow better on coarser textured, more friable soils.

Dunmore silty clay loam, eroded moderately steep phase (12 to 25 percent slopes) (Dac).—This is a deep, well-drained soil that developed from dolomitic limestone. It occurs on the short slopes of low-lying hills and ridges. It is widely distributed throughout the Dewey-Decatur-Dunmore and the Dunmore-Pace-Greendale soil associations.

The surface layer has been mixed with subsoil material by tillage. The present plow layer is yellowish-brown moderately friable silty clay loam. The subsoil is yellowish-red very firm clay, variegated with brownish yellow below a depth of about 27 inches. The limestone bedrock occurs at depths of 2½ to 9 feet.

Included with this soil are a few small spots that have a surface layer of yellowish-red firm silty clay. Other small spots have a surface layer of silt loam or loam.

This soil is moderately low in fertility. It contains a small amount of organic matter. It is medium acid to strongly acid. Partly because the permeability of the subsoil is moderately slow, runoff develops quickly and erosion is a hazard. This soil has a high water-holding capacity, but its capacity to supply water to plants is only moderate. The tilth is generally good, but the workability is somewhat poor because of the strong slopes.

Use and suitability (Capability unit IVe-2).—All of this soil has been cropped for many years. About 15 percent is in corn, 15 percent in small grains, 30 percent in hay, and 30 percent in pasture. The rest is used for other crops or is idle.

This soil is moderately well suited to tilled crops if they are grown in long rotations that consist chiefly of close-growing crops, preferably grasses and legumes. Much of this soil is probably best suited to pasture or semipermanent meadow. If the soil is adequately fertilized, it will support pasture of high quality. All the common pasture plants are suitable.

Dunmore silty clay loam, eroded steep phase (25 to 50 percent slopes) (Dad).—This well-drained soil of the uplands is distributed throughout the limestone belts of the county. It has formed from material weathered from clayey to high-grade limestone or from dolomitic limestone. It has lost more of its original surface soil than has Dunmore silt loam, sloping phase.

The present surface soil is yellowish-brown firm silty clay loam about 2 to 6 inches thick. The subsoil is yellowish-red firm silty clay or clay. Included are some small areas that have lost all the original surface soil.

This soil is closely associated with Dewey, Greendale, and Lindside soils, and with other Dunmore soils. Its surface soil varies more in color and thickness than that of Dunmore silt loam, sloping phase.

Use and suitability (Capability unit VIe-1).—Most of this soil is used for pasture or hay, but some is used for crops and some is idle. Because of the steep slopes, this soil is not suited to crops and is only moderately well suited to pasture. If it is adequately fertilized and otherwise well managed, it will support good pasture.

Dunmore silt loam, sloping phase (5 to 12 percent slopes) (Dv).—This is a deep, well-drained upland soil.

It occurs mainly under deciduous forest on rolling crests of low-lying hills or ridges. Much of it is in the limestone belts east of the Little River.

This soil is associated with the Dewey, Fullerton, Pace, Greendale, and Minvale soils and with other Dunmore soils. It has a lighter colored surface soil and a lighter red subsoil than the Dewey soils, and it is somewhat finer in texture. It differs from the Fullerton soils in having a less cherty profile, thinner soil layers, and a more clayey subsoil.

Profile description:

0 to 2 inches, grayish-brown or dark grayish-brown very friable silt loam; weak medium crumb structure.
2 to 9 inches, brown or yellowish-brown friable silt loam; moderate medium granular structure.
9 to 13 inches, yellowish-red firm silty clay or silty clay loam; strong medium subangular blocky structure.
13 to 27 inches, yellowish-red very firm clay; strong coarse subangular blocky structure.
27 to 48 inches +, yellowish-red very firm clay or silty clay; common, fine, distinct brownish-yellow variegations, which increase in size and number with increasing depth; moderate coarse subangular blocky structure.

The depth to the limestone bedrock generally ranges from 3 to 10 feet. A few bedrock outcrops occur. Some areas have small amounts of fine chert on the surface.

Included is a small acreage in which the profile is sandier throughout, especially in the surface soil, than the profile described. The bedrock below these inclusions is sandy limestone or limestone that contains thin lenses of sandstone. Except in a few places where the subsoil is clay loam, the sand has not affected the subsoil very much.

This soil is moderately low in natural fertility. It is medium acid to strongly acid. The organic-matter content is moderately low. Water is rapidly absorbed by the upper part of the soil, but the subsoil retards infiltration, and runoff develops quickly during heavy rains. The water-supplying capacity is moderate because the clayey subsoil holds moisture. The tilth is good.

Use and suitability (Capability unit IIIe-3).—Most of this soil is in forest that has been cut over several times. It consists mainly of thin stands of deciduous trees, chiefly oak, with which some pine is intermingled.

This soil is well suited to alfalfa, red clover, crimson clover, white clover, Ladino clover, lespedeza, grasses, small grains, corn, and tobacco. It is not so well suited to potatoes and other root crops. It is particularly well suited to livestock farming. Grass-and-legume pastures of high quality are easily maintained if the soil is well fertilized. This soil is especially well suited to alfalfa.

Dunmore silt loam, moderately steep phase (12 to 25 percent slopes) (Dw).—This soil of the uplands is deep and well drained. It occurs in small scattered areas throughout the dolomitic limestone belts. Much of it is in the southern part of these belts, mainly east of the Little River. This soil has thinner layers than Dunmore silt loam, sloping phase, and is somewhat shallower.

The surface soil is brown or yellowish-brown friable silt loam about 8 inches thick. The subsoil is yellowish-red very firm clay. The limestone bedrock is at depths of 2½ to 9 feet.

Use and suitability (Capability unit IVe-2).—All of this soil is in cutover deciduous forest. If cleared and used in long rotations, it would be suited to most crops, especially alfalfa, red clover, small grains, legumes, and grasses. It should be used most of the time for fall-sown small grains, hay, or pasture plants. If protected from erosion, this soil is well suited to corn.

Dunmore silt loam, steep phase (25 to 50 percent slopes) (Dx).—This inextensive soil of the uplands occurs on short steep slopes in scattered small areas throughout the dolomitic limestone belts. It is associated with less steep Dunmore soils. It has thinner layers than Dunmore silt loam, sloping phase, and is shallower to bedrock. Outcrops of bedrock are common in many areas.

In most places the surface soil is yellowish-brown friable silt loam about 6 to 8 inches thick. The subsoil is yellowish-red firm clay or silty clay. Included are a few areas that overlie bedrock containing thin lenses of sandstone. The soil in these areas contains some sand.

Use and suitability (Capability unit VIe-1).—All of this soil is in cutover deciduous forest. It is not suited to crops but would support good pasture if adequately fertilized. The pastures would be likely to erode unless protected from overgrazing. Unless more pasture is greatly needed, it is best to leave this soil in forest.

Dunmore silty clay, severely eroded sloping phase (5 to 12 percent slopes) (Dy).—This soil has developed under deciduous forest. The parent material was residuum derived from dolomitic limestone. Much of it is on slopes of 7 to 12 percent. The original surface soil of friable silt loam has been removed by erosion. The present surface layer, about 5 or 6 inches thick, is yellowish-red or strong-brown firm silty clay. The underlying material is yellowish-red very firm clay. The limestone bedrock occurs at depths of 2½ to 9 feet.

This soil has very poor tilth and very low water-supplying capacity; it is strongly acid and very low organic matter. The productivity is low and the workability poor. Even the surface soil absorbs water slowly, and runoff is a serious hazard.

Use and suitability (Capability unit IVe-4).—All of this soil has been used for crops, but much of it is now idle or in unimproved pasture. Some of it is used for small grains, hay, and pasture. It can best be used for grass-and-legume hay and pasture. Small grains can be grown as part of a long rotation.

Dunmore silty clay, severely eroded moderately steep phase (12 to 25 percent slopes) (Dz).—Like other Dunmore soils, this soil has developed from somewhat clayey dolomitic limestone. It occurs in scattered areas throughout the major limestone belts of the county. A few areas are in Millers Cove and Tuckaleechee Cove.

The 5- or 6-inch plow layer is yellowish-red firm silty clay. The underlying material is similar to the plow layer but contains more clay. The limestone bedrock is at depths of 2 to 8 feet. Outcrops of bedrock occur in a few places, but they do not prevent tillage.

Most of the few shallow gullies can be crossed with ordinary farm machinery and can be obliterated by deep tillage.

Most areas of this soil are on short slopes below areas of Dunmore soils that are less steep and less severely eroded. This soil is associated with Dewey and Fullerton soils on the uplands; with Greendale, Pace, and Minvale soils along drainageways; and with Lindside and Melvin soils on the bottom lands.

Use and suitability (Capability unit IVe-4).—All of this soil has been cropped. A large part is now idle or in unimproved pasture. A few areas are in small grains, and a small acreage is in corn. Yields are poor. This soil is very poorly suited to tilled crops. If properly managed it will support good pasture, but the pasture plants do not grow well in dry weather and are difficult to establish because the surface soil is clayey.

Emory silt loam, level phase (0 to 2 percent slopes) (Ea).—This is a well-drained soil that is developing in local alluvium. The alluvium was washed from associated soils—chiefly Decatur, Dewey, Farragut, and Cumberland—that were derived from high-grade limestone. This soil occupies narrow strips along intermittent drainageways and small areas in sinks. Most of the areas along the drainageways have very gentle slopes. They are not likely to be flooded except under very heavy precipitation. The areas in the sinks are nearly level or saucerlike. Much of their acreage is subject to temporary ponding because most of the water that flows onto them from surrounding slopes is carried away only through subterranean outlets.

Practically all of this soil occurs in the Dewey-Decatur-Dunmore soil association. Individual areas are small, but this soil is important to farming because it is highly productive.

Profile description:

0 to 18 inches, dark reddish-brown or dark-brown friable silt loam; moderate medium granular structure.
18 to 40 inches +, reddish-brown, dark reddish-brown, or dark-brown friable silt loam; moderate medium granular structure.

The limestone bedrock generally occurs at depths of 5 to 12 feet. In some places there are a few fine, prominent, yellowish-brown mottles below a depth of 36 inches. In some areas the material is yellowish-red silty clay loam below depths of 30 to 36 inches.

This soil is highly fertile. It is moderately high in organic matter and is medium acid. It is permeable and high in water-supplying capacity. The tilth of the plow layer is very good. There is no erosion hazard, but some areas receive overwash from adjacent slopes.

Use and suitability (Capability unit I-1).—Practically all of this soil has been cultivated. Most of it is used intensively for corn, small grains, and hay. Little is used for pasture.

This soil is well suited to intensive use. Much of it can be used in short rotations. It is well suited to practically all crops commonly grown, but good stands of alfalfa apparently can be maintained longer on the Decatur and Dewey soils than on this soil. The soil is well suited to pasture because its moisture content is good during the drier part of the grazing season.

Emory silt loam, gently sloping phase (2 to 6 percent slopes) (Eb).—This well-drained soil occurs on local alluvium washed from soils that were derived from high-grade limestone. These associated soils are chiefly of the Decatur, Dewey, Farragut, and Cumberland series. Most of this soil lies in strips along gently sloping drainageways and on fans where these drainageways join the larger valleys. Many small areas are in saucerlike depressions. Very little of the acreage is likely to erode, but sediments are deposited in several places by overwash from upland slopes. This soil is practically free of stones.

Much of this soil is in the Dewey-Decatur-Dunmore and Cumberland-Etowah-Emory soil associations. It is the most extensive Emory soil in the county and is important to farming.

Profile description:

0 to 18 inches, dark reddish-brown or dark-brown very friable silt loam; moderate medium granular structure.
18 to 40 inches, reddish-brown, dark reddish-brown, or dark-brown, friable, heavy silt loam.
40 inches +, red or yellowish-red friable or firm silty clay loam.

The limestone bedrock occurs at depths of 5 to 12 feet. In places, the dark-colored surface soil is 24 to 36 inches thick. In some areas, especially on the floors of sinks and in the lower parts of the areas next to drainageways, the material below depths of 30 to 36 inches has some grayish and yellowish mottles.

This is one of the most fertile soils in the county. It is moderately high in organic matter and is about medium acid. The tilth is generally good and fairly easy to maintain. This soil is permeable to roots, air, and moisture. Water is absorbed rapidly, and the water-supplying capacity is relatively high.

Use and suitability (Capability unit I-1).—Practically all of this soil is cultivated, much of it to corn, tobacco, and other row crops. Some truck crops are grown. Small grains and hay crops are commonly grown. Yields are very high. Very little of this soil is idle.

This soil is suited to rather intensive use. It is well suited to the common crops. If the fertility is maintained, this soil can be used in short rotations, and crops can be grown several years in succession.

Emory silty clay loam, gently sloping phase (2 to 5 percent slopes) (Ec).—This deep, well-drained soil occurs on recent alluvium. Much of the alluvium has been washed from the Talbott soils. In some places, the older alluvium has been covered by more recent alluvium washed mostly from finer textured subsoil material. This soil occurs in narrow strips along intermittent drainageways and on fans along the lateral drains that empty onto the flood plains. A small acreage occurs in saucerlike depressions. Much of this soil is in the northwestern part of the county, in the Talbott-Colbert-Lindside soil association.

This soil is somewhat lighter colored than the other Emory soils. Its surface soil is brown, dark-brown, or dark yellowish-brown moderately friable silty clay loam about 15 inches thick. The underlying material is moderately friable silty clay loam that is somewhat lighter in color than the layer above. Below depths of

26 to 30 inches, the material has grayish and yellowish mottles. The limestone bedrock generally occurs at depths of 3 to 10 feet. Little of this soil is subject to erosion, but many areas receive sediments or overwash from adjacent upland slopes. In places where an old surface layer has been buried by recent overwash, the upper part of the soil is reddish-brown or red silty clay loam.

This soil is somewhat less fertile than the Emory silt loams, but it is more fertile than the surrounding upland soils and contains more organic matter. The reaction is about medium acid. This soil remains moist during most of the growing season.

Use and suitability (Capability unit I-1).—Nearly all of this soil is used for field crops, to which it is well suited. The soil is suitable for use in short rotations; it can be used rather intensively for corn, tobacco, and vegetables if the fertility is maintained. Small grains, however, are likely to lodge because of the exceptionally high moisture content and high fertility. The common grasses and legumes grow luxuriantly.

Etowah silt loam, eroded gently sloping phase (2 to 5 percent slopes) (Ed).—This deep, well-drained soil occurs on stream terraces that are 25 feet or more above the flood plains. It has developed in mixed alluvium that consists of limestone materials or is strongly influenced by them. It is somewhat lighter colored throughout than the Cumberland soils and normally occupies lower positions. A large part of the acreage occurs along the Tennessee and Little Rivers in the Cumberland-Etowah-Emory soil association; these areas are on fairly broad, smooth alluvial benches. Other areas occur along some of the large creeks of the county, mainly on small remnants of terraces. The native cover was hardwood forest. Closely associated are soils of the Cumberland, Waynesboro, Lindside, and Emory series.

Profile description:

0 to 8 inches, dark-brown very friable silt loam; moderate fine granular structure.
8 to 21 inches, reddish-brown or yellowish-red friable silty clay loam; moderate fine and blocky structure.
21 to 45 inches, red or yellowish-red moderately friable silty clay loam; moderate fine and medium blocky structure; a few black specks and stains.
45 inches +, red friable silty clay loam; moderate medium subangular blocky structure; a few fine brownish-yellow variegations are common in this layer.

The depth to bedrock is rarely less than 8 to 10 feet. Most areas are underlain by limestone residuum.

This soil is medium acid. It is moderately high in natural fertility and about medium in organic-matter content. It is permeable to roots, air, and moisture. The moisture content is favorable, and the tilth is generally good. This soil is fairly easy to work and to conserve. It is practically free of stones.

Use and suitability (Capability unit IIe-1).—Nearly all of this soil is used for the crops common to the county. Little is idle. This productive soil is suitable for a wide range of crops and pasture, including alfalfa and vegetables. High yields can be obtained if this soil is adequately fertilized and otherwise well managed.

Etowah silt loam, eroded sloping phase (5 to 12 percent slopes) (Ee).—This soil has lost more of its original surface soil than has Etowah silt loam, eroded gently sloping phase, and its plow layer contains subsoil material. The plow layer is brown or dark-brown silt loam, and the subsoil is yellowish-red to reddish-brown moderately firm silty clay loam. The underlying material is similar to that of Etowah silt loam, eroded gently sloping phase. The bedrock is at depths of 5 to 15 feet.

This soil is moderately fertile. It is medium acid to strongly acid. It is permeable but requires more care to control runoff than does the eroded gently sloping phase. The water-supplying capacity is fairly high.

Use and suitability (Capability unit IIIe-1).—Nearly all of this soil has been cropped. Most of it is used for corn, small grains, and hay. This soil is suitable for a moderately long rotation of corn or tobacco followed by a small grain and then by 2 or 3 years of legume-and-grass hay. The more exacting legumes and grasses develop a good stand if this soil is adequately fertilized and limed.

Farragut silty clay loam, eroded gently sloping phase (2 to 5 percent slopes) (Fb).—This upland soil is well drained. It has developed in residuum that weathered from limestone containing thin lenses of shale. The upper part of the profile is similar to the upper part of the Decatur and Dewey soils in color, texture, and consistence. This soil, however, is generally shallower to the substratum, which is shaly. Most of this soil is on the broad crests of low, linear hills and ridges. It is closely associated with the Litz and Sequoia soils and the more strongly sloping Farragut soils.

Profile description:

0 to 7 inches, reddish-brown moderately friable silty clay loam; strong medium granular structure.
7 to 14 inches, reddish-brown firm silty clay or heavy silty clay loam; strong medium subangular blocky structure.
14 to 28 inches, red very firm clay or silty clay; strong coarse and medium subangular blocky structure.
28 to 48 inches +, red firm clay or silty clay; moderate coarse subangular blocky structure; contains a few small brownish-yellow shale fragments, which are soft and well leached; number of shale fragments increases with increasing depth.

The surface layer varies from place to place, depending on the amount of material that has been lost through erosion. Over most of the acreage the plow layer consists of a mixture of the original surface layer and subsoil. In a few spots, all of the original surface soil has been removed and the plow layer is reddish silty clay. In most places the depth to bedrock is 4 feet or more but in a few places it is 30 to 36 inches.

This moderately productive soil contains a moderate amount of organic matter. It is medium acid. It is moderately permeable to roots, but water infiltrates more slowly than in many of the coarser textured soils. The tilth is moderately favorable, but this soil is likely to puddle and clod if cultivated when wet. There are practically no stones, except for a few outcrops of limestone in some areas.

Use and suitability (Capability unit IIe-3).—Nearly all of this soil is used for crops. It is well suited to corn, small grains, legume-and-grass hay, pasture, and other

common crops. If well managed, it can be used for a 2- to 3-year rotation, but it is not suited to intensive cropping. Because of the clayey subsoil and slow percolation of water, runoff is likely to occur. This soil is especially well suited to alfalfa and other exacting legumes. Yields are high if the soil is adequately fertilized.

Farragut silty clay loam, eroded sloping phase (5 to 12 percent slopes) (Fc).—This soil of the uplands is well drained. It developed from shaly limestone or limestone containing lenses of shale, generally on the slopes of low-lying hills. Most of the acreage has lost more soil material through erosion than has Farragut silty clay loam, eroded gently sloping phase, and therefore it has a slightly more clayey plow layer.

The plow layer is a reddish-brown moderately friable silty clay loam. The underlying material is predominantly red very firm clay or silty clay. The shale and limestone bedrock is at depths of 3 to 5 feet. Most of this soil is in the Farragut-Sequoia soil association. It is most extensive just north of Maryville.

This moderately fertile soil responds well to fertilization and other good management. Roots can penetrate the entire depth of the soil, but water percolates through the heavy subsoil rather slowly. Because of this slow percolation and the moderately strong slope, runoff and erosion are likely to occur, and control measures are needed. The subsoil absorbs a large amount of water but holds it so tightly that much of it is not available to plants. The tilth of the plow layer is fairly good, but this soil can be tilled within only a narrow range of moisture content.

Use and suitability (Capability unit IIIe-3).—All of this soil has been cropped. Much of it is now in corn, small grains, and lespedeza, and much is in grass-legume pasture. A small acreage is idle.

This soil is well suited to practically all the crops of the county, but they should be grown in moderately long rotations that consist mostly of close-growing grasses and legumes. This soil is very well suited to all the pasture plants and hay crops. If it is adequately fertilized, it gives good yields of high-quality hay and pasture.

Farragut silty clay, severely eroded sloping phase (5 to 12 percent slopes) (Fa).—This is a well-drained upland soil that developed from the residuum of shaly limestone or limestone that contained lenses of shale. It occurs in small scattered areas throughout the narrow, discontinuous, low-lying valley that passes through the middle of the Great Valley portion of the county. Nearly all of the original surface layer has been removed by erosion. The plow layer is red to reddish-brown firm silty clay. The underlying material is red to yellowish-red firm clay or silty clay. Small soft fragments of shale normally occur below depths of 25 to 30 inches. The shale and limestone bedrock is 2½ to 5 feet below the surface. Outcrops of limestone occur in a few places.

This soil is low in fertility and organic matter. It is slowly permeable to water and roots and is droughty during dry periods. Because the surface layer contains much clay, the tilth is poor and difficult to maintain.

Use and suitability (Capability unit IVe-4).—All of this soil has been cleared. Much of it is now in unimproved pasture or is idle. About 15 percent is in corn and small grains. Several small areas have reverted to pine forest.

This severely eroded soil is poorly suited to tilled crops. Controlling runoff is a major problem, and this soil is highly susceptible to further damage by erosion. If it is adequately fertilized and otherwise well managed, close-growing grasses and legumes can be grown. Suitable grasses and legumes include alfalfa, red clover, white clover, orchardgrass, fescue, and lespedeza. This soil probably could be used for crops in long rotations if the tilth and the moisture-holding capacity are improved and the supply of organic matter is increased by growing close-growing crops for a long period.

Fullerton cherty silt loam, moderately steep phase (12 to 25 percent slopes) (Fd).—This is a well-drained soil of the limestone uplands. It has developed from low-grade or cherty dolomitic limestone. The native vegetation was dominantly upland hardwoods mixed with a few pines.

Most of this soil is on relatively long slopes, mainly in association with steeper areas of Fullerton soils. A large part of the acreage is in the extreme northwestern corner of the county. A few included areas on narrow ridge crests have slopes of 5 to 12 percent.

Profile description:

0 to 2 inches, grayish-brown or dark grayish-brown very friable cherty silt loam; moderate fine granular structure.
2 to 8 inches, light yellowish-brown very friable cherty silt loam; moderate fine granular structure.
8 to 14 inches, yellowish-brown friable cherty silt loam; moderate fine blocky structure.
14 to 20 inches, strong-brown or yellowish-red friable cherty silt loam; moderate fine subangular blocky structure.
20 to 43 inches, red or yellowish-red moderately firm silty clay loam; moderate medium subangular blocky structure.
43 to 60 inches +, red or yellowish-red cherty silty clay with few, fine, distinct brownish-yellow variegations; moderately firm; moderate medium blocky structure; most chert fragments are less than 2 inches in diameter; depth to bedrock is generally more than 10 feet.

This soil is low to very low in organic matter. It is strongly acid. The fertility is low to very low. This soil is permeable to air, roots, and moisture throughout its profile. Runoff is less than on similar noncherty soils. Because it is cherty and porous, this soil does not retain water well and tends to be droughty. Chert fragments on the surface and throughout the soil interfere with but do not prevent tillage. This soil is not so difficult to protect against erosion as the less permeable Decatur, Dewey, and Dunmore soils.

Use and suitability (Capability unit IVe-1).—Nearly all of this soil is under a cutover forest of deciduous trees and a few pines. It is somewhat poorly suited to crops. If cleared, it could be used for crops in a long rotation. It is suited to all of the pasture and hay plants. Yields of all crops are low unless large amounts of fertilizers and lime are applied.

Fullerton cherty silt loam, eroded moderately steep phase (12 to 25 percent slopes) (Fe).—This is a well-drained cherty upland soil developed from low-grade or cherty dolomitic limestone. It occurs mostly in the

extreme northwestern corner of the county generally on rather long slopes. The plow layer is yellowish-brown friable silt loam. The subsoil is yellowish-red friable to firm cherty silty clay loam. The limestone bedrock occurs at depths of 10 to 20 feet. Some areas have had substantial amounts of subsoil material mixed with the surface soil, and in such areas the surface soil is reddish and is somewhat higher in clay. Included with this soil are a few areas that have 5- to 12-percent slopes. These inclusions are on narrow ridge crests.

This soil is low in organic matter. It is strongly acid. The fertility is low. This soil is relatively permeable to moisture and roots, but, because it is shallower to the firm subsoil than Fullerton cherty silt loam, moderately steep phase, runoff is a more serious problem. The soil, however, absorbs water quite rapidly, and runoff is less of a problem than on the finer textured Decatur, Dewey, and Dunmore soils. This soil is somewhat droughty, and plant growth is restricted during long dry periods.

Use and suitability (Capability unit IVe-1).—All of this soil has been cultivated. About one-fourth of it is now in crops. About one-half is used for pasture, a large part of which is unimproved. The rest is idle.

This soil is rather poorly suited to tilled crops, but any of the common crops probably can be grown in 5- or 6-year rotations. Nearly all of the hay and pasture plants also can be grown. Yields, however, are low unless the fertility is kept fairly high.

Fullerton cherty silt loam, steep phase (25 to 50 percent slopes) (Ff).—This soil is similar to Fullerton cherty silt loam, moderately steep phase, but generally it has thinner soil layers and is shallower to bedrock. It occurs mainly in the northwest corner of the county. Most areas lie adjacent to the bottom land and terrace plains of the Tennessee River.

The surface layer is light yellowish-brown or yellowish-brown friable cherty silt loam about 7 inches thick. At a depth of about 15 inches, the material is yellowish-brown moderately friable cherty silty clay loam. The limestone bedrock occurs at depths of 8 to 20 feet. This soil is associated with the less steep Fullerton soils of the uplands, and with the Minvale, Pace, and Greendale soils on foot slopes and along drainageways.

This soil is relatively permeable to roots, air, and moisture. It has only moderate water-supplying capacity and is rather doughty. It is low in organic matter and is strongly acid. The fertility is low. Many chert fragments are scattered on the surface and throughout the soil. This chert seems to retard runoff, which is not so great as on the Dunmore, Dewey, and other chert-free soils.

Use and suitability (Capability unit VIe-1).—Nearly all of this soil is under a cutover forest consisting of deciduous trees and some pine. Because it is steep and cherty, this soil is very poorly suited to crops. It is not well suited to pasture, but fair pasture can be established if the soil is adequately fertilized and otherwise well managed. North- and east-facing slopes are better suited to pasture than other areas because they have a better supply of moisture. Forestry is probably the best use for this soil on most farms.

Fullerton cherty silt loam, eroded steep phase (25 to 50 percent slopes) (Fg).—Most of this soil occurs in the northwestern corner of the county, in areas of 10 to 20 or more acres. It lies on the steeper parts of the cherty ridges, mainly in association with Fullerton cherty silt loam, steep phase.

The 5- to 6-inch surface layer—a mixture of original surface soil and subsoil material—is yellowish-brown cherty silt loam. The underlying layers are similar to those of the steep phase. The limestone bedrock is at depths of 7 to 20 feet.

This soil is low in organic matter. It is medium acid to strongly acid. It absorbs moisture fairly rapidly. Because it is shallower to the firm subsoil than Fullerton cherty silt loam, steep phase, it is somewhat less suitable for cultivation. The fertility is low. The moisture-supplying capacity is fair. The south-facing slopes are generally more droughty than the north-facing slopes.

Use and suitability (Capability unit VIe-1).—All of this soil has been cropped, but much of it is now in unimproved pasture or is idle. A small part has reverted to pine forest. This soil is poorly suited to crops or pasture. Substantial amounts of fertilizer and lime are needed if it is used for pasture. The north-facing slopes are better suited to pasture than the south-facing slopes.

Greendale silt loam (1 to 6 percent slopes) (Ca).—This extensive well-drained soil occurs on colluvium and local alluvium derived mainly from the Dunmore and Fullerton soils. It is scattered widely throughout all the limestone belts of the county, wherever the parent Dunmore and Fullerton soils occur. It occupies narrow, concave strips along intermittent drainageways and foot slopes. A small acreage is in small, saucerlike depressions and sinks. Many areas occur where lateral drains have deposited sediments on large flood plains. Although most of this soil is practically free of chert and stones, many areas have small amounts of chert that do not impair the productivity of the soil.

Profile description:

0 to 12 inches, yellowish-brown to brown very friable silt loam; moderate fine granular structure.
12 to 30 inches, yellowish-brown or light yellowish-brown, friable, heavy silt loam that grades to light silty clay loam in places; moderate medium granular structure.
30 to 48 inches +, yellowish-brown heavy silt loam with a few brownish-yellow and gray mottles; mottles are more numerous below 36 inches; almost all areas are underlain by limestone residuum at depths of 4 to 12 feet.

This moderately fertile soil contains a medium amount of organic matter and is medium acid. It has very good tilth. Its water-supplying capacity is high. Most areas receive runoff and seepage water from the adjacent higher lying soils. This soil is permeable to roots, air, and moisture. There is little or no erosion hazard. The supply of plant nutrients and organic matter is replenished by deposits from adjacent upland slopes.

Use and suitability (Capability unit I-1).—Nearly all of this soil has been cleared of its native hardwood forest. Probably two-thirds of the acreage is used for such crops as corn, tobacco, vegetables, and lespedeza. Most of the rest is used for pasture. Many areas are small and are used in the same way as the rest of the field in which they occur.

This soil is well suited to moderately intensive use. All of the common row crops can be grown. If it is adequately fertilized, yields are high. Alfalfa appears to be better suited to the Dunmore and other finer textured soils of the uplands, but fair yields of alfalfa are obtained in places on this soil. Pastures on this soil are good, even during the dry parts of the growing season.

Gullied land, limestone material (10 to 40 percent slopes) (Gb).—This land type consists of areas of Decatur, Dewey, Talbott, Fullerton, and Dunmore soils that have been severely damaged by erosion. In most places, much or all of the surface soil has been removed, and gullies of various depths form an intricate pattern. The surface is too rough for the use of ordinary farm machinery. Most of this land is hilly. It is low in fertility and has poor tilth. A great part of it is droughty because the clayey subsoil material has a low water-supplying capacity. Most of this land type is in the Dewey-Decatur-Dunmore and the Dunmore-Pace-Greendale soil associations.

Use and suitability (Capability unit VIIs-1).—All of the acreage has been cropped at some time. Much of it now has a variable cover of briers, sassafras, and other weeds. Some is in pine forest that has reestablished itself.

This land type is poorly suited to either crops or pasture. Most of it should be kept in forest. Some of the less severely gullied areas can be used for pasture if they are smoothed off with heavy machinery, then properly fertilized and seeded. The cost of preparing the land for pasture is high.

Gullied land, shale or sandstone material (10 to 65 percent slopes) (Gc).—This land type consists of areas of Tellico, Dandridge, Litz, Christian, and Sequoia soils that have been severely damaged by erosion. Much of the surface soil has been removed, and gullies of various depths form an intricate pattern. The surface is too rough for the use of ordinary farm machinery. The general lay of the land is hilly to steep.

In the areas that were formerly occupied by Dandridge, Litz, Sequoia, and Christian soils, only a few of the gullies exceed 3 feet. The gullies in the areas that were occupied by Tellico soils are moderately shallow to very deep; some are as much as 20 feet deep. A great part of the original surface soil of the Dandridge and Litz soils has been removed. In the Tellico areas, a notable part of the surface layer still remains because the erosion was confined mostly to the gullies.

Much of this mapping unit is low in fertility, and a great part is very droughty. The shale bedrock is at or very near the surface in much of the Dandridge and Litz areas, but the depth to bedrock in the Tellico areas is more variable. This land type is widely distributed throughout the Dandridge-Whitesburg-Hamblen, the Tellico-Alcoa-Neubert, and the Sequoia-Litz-Hamblen soil associations.

Use and suitability (Capability unit VIIs-1).—All of the acreage has been cleared and cropped at some time. Some areas have reverted to pine forest, but much of this land type has a cover of briers, sassafras, and other weeds. Kudzu has been established in a few areas.

Many of the areas consisting of Dandridge and Litz soil materials can be reclaimed and used for pasture. The cost of establishing the pasture would be high because the soil would have to be smoothed before seeding and protected until the pasture plants became established. The Tellico areas would be more difficult to reclaim than the other areas. Probably most of this unit is best suited to pine forest.

Hamblen silt loam (0 to 2 percent slopes) (Hb).—This is an imperfectly drained soil of the bottom lands. It consists of mixed general alluvium. This alluvium was washed partly from sandy soils and partly from the residuum of calcareous shale, acid shale, slate, sandstone, and limestone. Some areas consist mainly of calcareous shale materials; others consist of mixtures of many kinds of parent materials. Some of this soil is in slight depressions. A large part is subject to flooding.

This soil is widely distributed along streams that flow through or originate in areas of shale, slate, or sandstone. Along the creeks and branches, this soil often occupies the entire flood plain. Large acreages occur along Ninemile, Sixmile, and Ellejoy Creeks, and along the Little River. Along the Little River and other large streams, this soil normally occurs near the rim of the flood plain, between the well drained Staser and the poorly drained Prader soils. Along the Little River, this soil has been influenced more by limestone than in other areas and is browner in color. This soil is reddish in places where it has received a substantial amount of material from Tellico soils.

Profile description:

0 to 15 inches, brown or yellowish-brown very friable silt loam; moderate fine granular structure.
15 to 36 inches, yellowish-brown or dark yellowish-brown friable heavy silt loam; some gray and yellow mottles.
36 to 48 inches +, mottled grayish-brown, gray, and yellow friable silt loam or light silty clay loam; layer is grayer with increasing depth and is dominantly gray at 48 inches.

In places a dark-brown silt loam layer occurs at depths of 7 to 20 inches. This is an old surface layer on which lighter colored material has been deposited. Largely because of the many different kinds of parent materials, the color of the upper part of this soil varies greatly from place to place.

This soil is slightly acid. It is moderately high in natural fertility. It has a high capacity to hold water and supply it to plants. The tilth is generally good, but excess moisture during wet periods frequently delays the planting of crops and occasionally interferes with cultivation and harvesting. This soil is friable and permeable throughout its depth, but the water table rises during periods of high rainfall. Except during wet periods, this soil is easy to work.

Use and suitability (Capability unit IIw-1).—Practically all of this soil is used for corn, hay, and pasture. Very little is idle. Many areas are intensively used for row crops. This soil is well suited to intensive use for corn, sorghum, and soybeans. Because it has imperfect internal drainage and is likely to be flooded, it is rather poorly suited to tobacco, vegetables, and alfalfa. It is well suited to red clover, white clover, lespedeza, orchardgrass, timothy, fescue, and other grasses and legumes. Because of its high moisture content, it provides supplemental grazing during the more droughty parts of the growing season when upland pastures are dry.

Hamblen silt loam, local alluvium phase (0 to 2 percent slopes) (Hc).—This imperfectly drained young soil consists of local alluvium that was washed from uplands underlain mainly by acid rocks. In this county most of the materials have been washed from soils of the Litz, Sequoia, Montevallo, Lehew, Allen, Jefferson, and Ramsy series.

This soil occurs in very gently sloping strips along narrow intermittent drainageways. It is closely associated with the Barbourville soils and differs from them mainly in being less well drained where it occurs within the mountainous region. In the shale valleys, it is associated with the Leadvale, Muse, Sequoia, and Litz soils.

Profile description:

0 to 12 inches, grayish-brown to yellowish-brown friable silt loam.
12 to 28 inches, yellowish-brown friable silt loam mottled with yellow and gray.
28 inches +, mottled gray, yellow, and brown friable silt loam or light silty clay loam; layer is predominantly gray at depths of 36 to 40 inches.

Along lateral streams that extend into the Chilhowee Mountain range, this soil contains notable amounts of sand throughout the profile. Mainly because of seepage, some spots are wet or poorly drained. Very little of the acreage is likely to be flooded, but sediments from upland slopes are deposited on most areas. Included with this soil are some areas that have a loam surface soil.

This soil is generally medium acid to strongly acid. It contains a moderate amount of organic matter but apparently is low in phosphorus, potassium, and other plant nutrients. The soil has high water-supplying capacity. It remains moist during most of the year, but in some places excess water during wet periods interferes somewhat with planting and cultivation. At other times, this soil has good tilth and is easy to work.

Use and suitability (Capability unit IIw-1).—Nearly all of this soil has been cropped. The most common crops are corn and lespedeza. Because of their small size, many areas are not used as separate units but are used with the soils of the adjacent uplands.

Because of the excess moisture, this soil is not well suited to alfalfa, truck crops, and tobacco. It is risky to grow small grains, but high yields are obtained in places. This soil is well suited to corn, sorghum, soybeans, and other summer annuals. It is well suited to red clover, lespedeza, white clover, redtop, timothy, fescue, and other plants for hay and pasture. It furnishes supplemental grazing during dry periods. If this soil is adequately fertilized, yields are high.

Hamblen loam (0 to 2 percent slopes) (Ha).—This is an imperfectly drained soil on bottom lands. It consists of general mixed alluvium that contains more sandy material than the parent material of Hamblen silt loam. This soil is nearly level or slightly depressed. Most of it is likely to be flooded. Much of the acreage occurs along the Little River and in the mountain coves where a part of the alluvium was washed from the sandy Ramsey soils. This soil occupies the entire flood plain along many of the small streams. Along the Little River and other large streams it lies between the well drained Staser and the poorly drained Hamblen soils.

Profile description:

0 to 16 inches, brown or yellowish-brown very friable loam.
16 to 30 inches, yellowish-brown friable loam; some yellow and gray mottles that are more numerous with increasing depth.
30 inches +, mottled grayish-brown, gray, and yellow very friable loam or fine sandy loam.

The areas along the Little River are browner in color than the areas along the creeks and small streams. Some areas have beds of gravel and cobbles at depths of 36 inches or more. These beds are likely to be at the base of the deposit. In most places the depth to bedrock is at least 5 feet.

This moderately fertile soil is slightly acid and contains a medium amount of organic matter. It has a high capacity to hold water and supply it to growing plants. The tilth is generally very good, but excess moisture during wet periods frequently delays the planting of crops and occasionally interferes with cultivation and harvesting. This soil is very friable and permeable throughout, but the water table is near the surface during periods of high rainfall. Except during wet periods, this soil is very easy to work.

Use and suitability (Capability unit IIw-1).—Practically all of this soil has been cropped for many years. A large acreage is used for corn. Lespedeza is the most common hay crop, but red clover, white clover, timothy, orchardgrass, and fescue for hay or pasture are commonly grown. Very little of this soil is idle.

This soil is well suited to intensive use for corn, sorghum, soybeans, and such hay crops as lespedeza, red clover, orchardgrass, and timothy. White clover and fescue are suitable pasture plants. Because of the flood hazard and the rather slow internal drainage, this soil is not well suited to tobacco, vegetables, and alfalfa. It is especially valuable for supplemental pasture because it remains moist during the drier periods when pastures on uplands are dry.

Hayter silt loam, gently sloping phase (2 to 5 percent slopes) (Hd).—This is a well-drained soil that is developing in local alluvium or colluvium that rolled or was washed from slate and sandstone uplands. In this county almost all of the materials have come from Ramsey soils. Many areas lie adjacent to limestone or are underlain by it. A large part of this mapping unit occurs in the three largest coves of the county—Millers, Tuckaleechee, and Cades. Other areas are scattered along the mountain foothills. The areas in Cades

469687—59——3

and Tuckaleechee Coves are developing mainly from slate materials. This soil is associated with Allen, Jefferson, Muse, Barbourville, and Ramsey soils.

Profile description:

0 to 8 inches, dark-brown or dark yellowish-brown very friable silt loam.
8 to 14 inches, dark-brown very friable silt loam; weak fine blocky structure; a few small, platy slate fragments.
14 to 31 inches, strong-brown friable clay loam; weak fine blocky structure; a few very small, platy slate fragments.
31 to 48 inches, strong-brown to yellowish-brown friable clay loam; weak fine and medium blocky structure; numerous platy slate fragments.

Most areas of this soil are underlain by limestone residuum; a few areas are underlain by slate or shale. The depth to bedrock is generally more than 5 feet. In the mountain coves some of this soil occupies terracelike positions. The subsoil is red or yellowish red in places. A few inclusions in Millers Cove and others along the base of the Chilhowee Mountain range have a loam surface soil that is developing mainly from quartzite and sandstone materials.

This fertile soil contains a moderate amount of organic matter. It is medium acid to strongly acid. The tilth is very good, and the water-supplying capacity is high. Water is absorbed rapidly and runoff is not a serious problem. This soil is easy to work and to conserve. It is permeable to roots, air, and moisture.

Use and suitability (Capability unit IIe-1).—Most of this soil is used for corn, small grains, and lespedeza. A small acreage is used for tobacco. In Cades Cove a large acreage is used for hay crops and pasture. Very little of the acreage is idle. This soil is suitable for use in short rotations. It is well suited to all the crops and pasture plants commonly grown, including truck crops and tobacco.

Hayter silt loam, sloping phase (5 to 12 percent slopes) (He).—This well-drained soil is developing from alluvium and colluvium. A large part of the acreage is in Cades Cove and Tuckaleechee Cove. A few areas are in Millers Cove, and other small areas are scattered throughout the mountains on smooth foot slopes. This soil has lost some of its original surface soil through erosion; the upper part of the subsoil has been mixed with the present surface soil in many places. Because the subsoil is not fine textured, however, this slight mixing has not changed the physical properties of the surface soil very much.

The plow layer is brown or dark-brown friable silt loam. The subsoil is yellowish-brown to strong-brown friable clay loam or light silty clay loam. Most areas are underlain by limestone residuum at depths of 5 feet or more.

This fertile soil contains a moderate amount of organic matter. It is medium acid to strongly acid. It is permeable to roots, air, and moisture. The water-supplying capacity is relatively high. The tilth is generally very good and easy to maintain. This soil is not difficult to protect against erosion.

Use and suitability (Capability unit IIIe-1).—Most of this soil has been cropped. The main crops are corn, small grains, and lespedeza. Tobacco and vegetables occupy a small acreage. Very little of this soil is idle.

This soil is well suited to all the commonly grown crops. Row crops can be grown in rotations of moderate length. Alfalfa needs moderately heavy fertilization for high yields. This soil is deficient in lime, phosphorus, and potassium.

Hayter stony silt loam, gently sloping phase (2 to 5 percent slopes) (Hf).—This well-drained soil is developing on colluvium and alluvium that have washed mainly from the slaty Ramsey soils of the uplands. Most of this soil occurs in Cades Cove and Tuckaleechee Cove. It is common on fans and benches around the heads of these coves, and at the mouth of mountain gorges where sediments have been deposited on the adjoining valley floor.

This soil differs from Hayter silt loam, gently sloping phase, mainly in having many stones on the surface and throughout the soil. The stones are mainly angular and subangular fragments of slate. Most of them are more than 10 inches in diameter.

The surface soil is a brown or dark-brown friable stony silt loam. The subsoil is a yellowish-brown or strong-brown friable stony clay loam. Most areas are underlain by limestone residuum at depths of 5 feet or more.

This soil is associated with the Allen and Jefferson soils on the older colluvial foot slopes, and with the Ramsey soils on the steep mountain slopes. On alluvium, it is associated with the Barbourville, Staser, and Hamblen soils that lie along the drainageways below it.

This soil is medium acid to strongly acid. It contains a moderate amount of plant nutrients and organic matter. The many stones on the surface and in the soil interfere with tillage and, in some spots, almost prevent it. The soil material is very permeable to roots, air, and moisture. Except for the stones, the soil has very good physical properties.

Use and suitability (Capability unit VIs-2).—Practically all of this soil has been cropped. A large part is now used for unimproved pasture or is idle. A few areas are used for corn, small grains, vegetables, tobacco, and other crops. Some areas, particularly those in Cades Cove, are in second-growth Virginia pine. This soil is suited to practically all crops and to hay and pasture plants. It is difficult to work with farm machinery because of the stones. Clipping hay and pasture is very difficult and, in places, almost impossible.

Hayter stony silt loam, sloping phase (5 to 12 percent slopes) (Hg).—This well-drained soil is developing in colluvium or local alluvium. The parent materials have rolled or been washed mainly from the salty Ramsey soils. Most of this soil occurs in Tuckaleechee Cove and Cades Cove. It is common around the heads of coves or at the mouths of mountain gorges.

The surface soil is a brown to dark-brown friable stony silt loam. The underlying material is yellowish-brown or strong-brown stony clay loam. Most areas are underlain by limestone residuum at depths of 5 feet or more. This soil is associated with the Ramsey, Jefferson, Allen, Barbourville, Staser, and Hamblen soils.

Some spots have yellowish-red subsoils. On some of the more strongly sloping areas, the surface soil is yellowish brown. Included with this soil are a few areas that contain more sand throughout the profile than is normal. The surface soil of these inclusions is stony fine sandy loam.

This soil is medium acid to strongly acid. It contains a moderate amount of plant nutrients and organic matter. Because of the stones, this soil is difficult to work. The soil material, however, has good physical properties; it is permeable and has moderately favorable moisture relations. Water is absorbed at a rapid rate, and runoff is not a serious problem.

Use and suitability (Capability unit VIs-2).—About three-fourths of this soil has been cropped. Much of it is now in unimproved pasture or is idle. Many areas, particularly near Cades Cove, are reverting to Virginia pine. A very small acreage is used for corn, small grains, vegetables, and other crops. A wide variety of crops can be grown on this soil, but the stones hinder farming and may make cultivation uneconomical.

Hermitage silt loam, gently sloping phase (2 to 5 percent slopes) (Hh).—This well-drained soil has developed in local alluvium and colluvium that were derived chiefly from high-grade limestone. The material has rolled or been washed from Decatur, Dewey, and Talbott soils, and to some extent from Dunmore soils. Most of this soil is in the Dewey-Decatur-Dunmore soil association. It lies on gently sloping foot slopes between the soils of the upland and the narrow strips of Emory soils along the drainageways. This soil differs from the Emory soils chiefly in being more reddish and in having a firmer subsoil.

Profile description:

0 to 10 inches, dark-brown very friable silt loam.
10 to 20 inches, reddish-brown friable light silty clay loam.
20 to 39 inches, yellowish-red to reddish-brown friable silty clay loam.
39 to 54 inches +, yellowish-red to red friable silty clay loam; a few brownish-yellow variegations.

The surface soil is 3 to 12 inches thick. It is uniformly brown to dark brown. Some areas that are associated with the Dunmore soils have a yellowish-brown subsoil. The depth to bedrock ranges from 5 to 12 feet.

This is a fertile soil that contains a moderate to rather large amount of organic matter. It is medium acid to strongly acid. The surface soil is permeable, and the subsoil is moderately permeable. Roots penetrate extensively, and the capacity for holding moisture available to plants is high. The erosion hazard is slight, although on the more strongly sloping parts some care may be required to control erosion.

Use and suitability (Capability unit IIe-1).—Nearly all of this soil has been used for crops. About 25 percent is now used for corn, 25 percent for pasture, and almost 25 percent for hay. The rest is used for tobacco, vegetables, and other crops.

This is one of the best soils in the county for crops and pasture. It is suited to a wide variety of crops. The more exacting legumes and grasses grow well, and the carrying capacity of the pastures is high.

Although this is one of the best soils in the county for growing alfalfa, good stands of alfalfa probably can be maintained longer with less difficulty on the Dewey and Decatur soils.

Hermitage silt loam, eroded gently sloping phase (2 to 5 percent slopes) (Hk).—This well-drained soil has developed in local alluvium or colluvium that was derived chiefly from high-grade limestone. The material rolled or was washed from Decatur, Dewey, and Talbott soils, and to some extent from Dunmore soils. Much of the acreage is in the Dewey-Decatur-Dunmore soil association. It normally occurs on gently sloping narrow strips immediately below the upland slopes that are occupied chiefly by Dewey and Decatur soils. It is generally above the young Emory soils that are normally along the drainageways.

The surface soil contains more clay and is more reddish than the surface soil of Hermitage silt loam, gently sloping phase. The plow layer is brown to reddish-brown friable silt loam. The subsoil is yellowish-red or red friable silty clay loam. This soil is practically free of stones.

This is a fertile soil that is relatively high in organic matter. It is medium acid to strongly acid. It is permeable to roots, air, and moisture. The water-supplying capacity is relatively high. This soil is easy to work and not difficult to conserve. It absorbs water at a rapid rate, and controlling runoff is not a serious problem.

Use and suitability (Capability unit IIe-1).—All of this soil has been cleared of its native hardwoods and used for crops. About 25 percent of it is used for corn, 25 percent for pasture, and almost 25 percent for hay. A small part is used for small grains. The rest is used for tobacco, vegetables, and other crops. This is one of the best soils in the county for crops and pasture. It is suited to all crops commonly grown and to the more exacting legumes and grasses.

Hermitage silt loam, eroded sloping phase (5 to 12 percent slopes) (Hl).—This soil has a plow layer that, in many places, consists of a mixture of original surface soil and the upper subsoil. In these places the plow layer consists of a reddish-brown or dark-brown silt loam. The underlying material is similar to that of Hermitage silt loam, gently sloping phase, but it is somewhat shallower. This soil is widely distributed throughout the Dewey-Decatur-Dunmore soil association.

This fertile soil is moderate to high in organic matter. It is medium acid to strongly acid. It is permeable to moisture. Because it is shallow and sloping, runoff and erosion are likely. The moisture-supplying capacity is good.

Use and suitability (Capability unit IIIe-1).—All of this soil has been cultivated. Much of it is now used for crops, mainly corn, hay, and small grains. Tobacco is the most important cash crop.

This soil is suited to a wide variety of crops, but because of its moderately strong slope, it should not be used so intensively as Hermitage silt loam, gently sloping phase. A suitable rotation consists of a row crop, a small grain, and 2 or 3 years of hay. The more

desirable legumes and grasses are well suited and yield well, either as hay or pasture.

Holston fine sandy loam, eroded sloping phase (5 to 12 percent slopes) (Hn).—This well-drained soil occurs on low to moderately high stream terraces. It has developed from a mixture of alluvium derived from shale, sandy rocks, and limestone. Most of the acreage is 10 to 30 feet above the adjacent flood plains. A few areas along the Little River are nearly 100 feet above the flood plains. Much of this soil is along Ninemile Creek; small scattered areas lie along the larger creeks. A very small acreage is along the Little River.

Profile description:

0 to 8 inches, light yellowish-brown very friable fine sandy loam.
8 to 12 inches, yellowish-brown friable loam.
12 to 32 inches, brownish-yellow moderately friable clay loam.
32 to 48 inches +, brownish-yellow moderately friable clay loam; common light-gray mottles.

The depth to bedrock ranges from 4 to 12 feet. The bedrock is shale almost everywhere. Many cobblestones occur on a very small part of the acreage. In some areas along the creeks, mottles or splotches occur at a depth of less than 32 inches from the surface.

Included with this soil are areas of very fine sandy loam and loam. A few severely eroded spots have a plow layer that is mostly subsoil material. Other inclusions are about 175 acres that have 2 to 5 percent slopes, and about 69 acres that have 12 to 25 percent slopes.

This soil is very low in fertility and contains little organic matter. It is strongly acid. It is permeable and has a fair capacity to hold water that plants can use.

Use and suitability (Capability unit IIIe-2).—Nearly all of this soil has been cleared and cropped. It is used for a wide variety of crops, including corn, small grains, tobacco, and hay, chiefly lespedeza.

This soil is well suited to tobacco, vegetables, and nearly all other crops commonly grown. Erosion is not a great hazard. If good yields are to be obtained, substantial amounts of fertilizer and lime must be applied. The more exacting legumes and grasses are suited to this soil, but good stands are somewhat more difficult to maintain than they are on some of the more fertile red soils.

Jefferson fine sandy loam, gently sloping phase (2 to 5 percent slopes) (Je).—This is a well-drained soil that has developed from local alluvium or colluvium that has been washed chiefly from the Ramsey soils. The parent rock of the materials is chiefly sandstone and quartzite intermixed with some slate. This soil occurs on gentle foot slopes and the board crests of low-lying hills, mostly along the foot slopes of Chilhowee and Little Mountains. The Chilhowee Mountain is a high, linear, even-crested ridge that extends across the county from southwest to northeast. The Little Mountain is similar to the Chilhowee range but is lower lying. It appears to be an outlier of the Chilhowee range.

This soil is associated with the Barbourville and Hamblen soils that lie along the drainways in positions lower than the Jefferson soils. It is also associated with the Ramsey soils that are on the higher lying steep mountain slopes.

Profile description:

0 to 9 inches, pale-brown very friable fine sandy loam; weak medium crumb structure.
9 to 14 inches, yellowish-brown very friable fine sandy loam; weak medium granular structure.
14 to 34 inches, strong-brown friable fine sandy clay loam or clay loam; moderate fine and medium angular blocky structure.
34 to 54 inches +, reddish-yellow friable sandy clay loam or clay loam.

Nearly all areas of this soil are underlain by shale, slate, or sandstone residuum at depths of 4 to 10 feet.

This soil is strongly acid and very low in fertility and organic matter. It has very good tilth and is easy to work. It is very permeable to air and moisture and permeable to roots. Water is absorbed rapidly, and the available moisture-holding capacity is high. The soil is nearly free of stones, but a few small sandstone fragments occur in places.

Use and suitability (Capability unit IIe-2).—Nearly all the acreage has been cleared and cropped. About 15 percent remains in a cutover mixed hardwood and pine forest. About 25 percent is used for corn, small grains, tobacco, and other crops. Except for a small idle acreage, the rest is used for hay and pasture, chiefly lespedeza and volunteer plants.

If this soil is adequately fertilized, it is well suited to nearly all of the common crops. Partly because of its gentle slopes and good permeability, it is suitable for short rotations. Unless it is well fertilized, yields of all crops are very low.

Jefferson fine sandy loam, eroded sloping phase (5 to 12 percent slopes) (Jf).—This is a well-drained soil developing in local alluvium or colluvium that has been washed chiefly from the sandy Ramsey soils. It occurs mainly along the foot slopes of Chilhowee and Little Mountains. Because it has stronger slopes than Jefferson fine sandy loam, gently sloping phase, slightly more of its original surface soil has been removed through erosion and more subsoil material has been mixed with the plow layer by tillage.

The upper 6 inches of this soil is yellowish-brown very friable fine sandy loam. The underlying material is brownish-yellow friable clay loam or fine sandy clay loam. Nearly all of this soil is underlain by shale, slate, or sandstone residuum at depths of 3 to 9 feet.

About one-third of the acreage is still under forest and is relatively uneroded; here the surface soil is a pale-brown friable fine sandy loam about 8 to 9 inches thick and similar to that of Jefferson fine sandy loam, gently sloping phase.

This soil is very low in fertility and is strongly acid. It has good tilth and is easy to work. It is permeable to roots and very permeable to air and moisture. Water is readily absorbed, and the available moisture-supplying capacity is moderately high.

Use and suitability (Capability unit IIIe-2).—About 65 percent of this soil has been cropped; the rest is under badly cutover forest of mixed hardwoods and pine. Probably 25 percent of the cleared portion is

now used for corn, small grains, tobacco, and other crops. The rest is used mostly for hay and pasture, chiefly lespedeza and volunteer plants. Pastures are largely unimproved. Many areas of this soil are idle.

This soil is well suited to cultivated crops, but it should not be used intensively for row crops. It is suitable for a 4-year rotation in which close-growing crops are used for 3 years. Although nearly all of the common crops can be grown, yields of alfalfa and similar crops are low. These crops do not last so long on this soil as they do on the finer textured red upland soils. This soil is suited to truck crops and tobacco because it is easily worked, warms early in spring, and responds readily to fertilization.

Jefferson fine sandy loam, moderately steep phase (12 to 25 percent slopes) (Jg).—This is a well-drained soil developing in local alluvium or colluvium that has been washed chiefly from the sandy Ramsey soils. The parent rock of the materials is chiefly quartzite and sandstone intermixed with slate.

Most of this soil occurs on the moderately steep foothills of Chilhowee and Little Mountains. Much of it lies in the narrow valley between these two mountain ranges. A very small acreage occurs along Bays Mountain where the materials have washed or rolled from the Lehew soils. These areas have a little less sand throughout their profile than the typical soil.

Because of its moderately steep slopes, this soil is shallower than Jefferson fine sandy loam, gently sloping phase, and it has thinner soil horizons; more original surface soil has been removed from the cleared areas.

The surface soil in cultivated areas is a yellowish-brown friable fine sandy loam. The forested areas have a surface soil of pale-brown very friable fine sandy loam. The subsoil is a brownish-yellow fine sandy clay loam or clay loam. Nearly all areas are underlain by shale, slate, or sandstone residuum at depths of 2½ to 7 feet. Included with this soil are a few exposed cultivated spots that have a surface soil of brownish-yellow clay loam.

Use and suitability (Capability unit IVe-1).—About 50 percent of this soil is still under a forest of mixed hardwoods and pine that has been cut over many times. The cleared acreage is used mostly for unimproved pasture, but a significant amount is idle. About 15 percent of the acreage is used for corn, small grains, tobacco, vegetables, and other crops.

This soil is physically suited to nearly all common crops. Because it is strongly sloping and difficult to conserve, probably it is suited to row crops only when they are grown in 5- or 6-year rotations. Unless it is adequately fertilized and otherwise well managed, it is not well suited to grasses and legumes, but grasses and legumes of high quality can be grown under proper management.

Jefferson fine sandy loam, steep phase (25 to 50 percent slopes) (Jh).—This soil occurs mostly on steep mountain foothills along Chilhowee and Little Mountains. It is similar to Jefferson fine sandy loam, gently sloping phase, but because its slopes are steeper, it has thinner horizons and shallower depth to bedrock. In addition, more of the original surface soil has been removed from the few cleared areas through erosion. Most areas are still under forest. These areas have a pale-brown friable fine sandy loam surface soil about 7 inches thick. The underlying material is a brownish-yellow friable clay loam or fine sandy clay loam. The depth to the bedrock of shale, slate, or sandstone generally ranges between 2 and 6 feet.

Use and suitability (Capability unit VIe-1).—All except 54 acres of this soil is still under native forest of mixed hardwoods and pine. The cleared areas are used mainly for unimproved pasture or are idle.

This soil is poorly suited to tilled crops. Good pastures can be established and maintained under a high level of management that includes heavy fertilization and controlled grazing. Nearly all of the common pasture plants can be grown. Because of the steep slopes and the associated steeper shallow soils, this soil probably should be used for forest on most farms.

Jefferson cobbly fine sandy loam, sloping phase (5 to 12 percent slopes) (Jc).—This soil was developed from local alluvium or colluvium that rolled or was washed from the stony Ramsey soils. Nearly all of it occurs on foot slopes of Chilhowee and Little Mountains. Much of the acreage lies between these two linear mountain ranges. This soil is closely associated with the Ramsey, Barbourville, and Hamblen soils. It differs from Jefferson fine sandy loam, gently sloping phase, chiefly in having a stronger slope and in containing enough cobbles to interfere with cultivation. Because of the cobbles, cultivation is impractical in some spots.

This soil has an 8- to 10-inch surface soil of pale-brown or light yellowish-brown friable cobbly fine sandy loam. Underlying this layer is brownish-yellow friable cobbly fine sandy clay loam or clay loam. Below a depth of about 32 inches is variegated yellowish-brown, brownish-yellow, and yellowish-red friable fine sandy clay loam. The depth to shale, slate, or sandstone bedrock generally ranges from 3 to 12 feet. On some of the more strongly sloping cleared areas, the surface soil is yellowish-brown cobbly fine sandy loam about 7 inches thick. This layer is underlain by brownish-yellow cobbly fine sandy clay loam.

This soil is very low in fertility and contains little organic matter. It is strongly acid. It is very permeable to roots, air, and water, and runoff does not accumulate very rapidly.

Use and suitability (Capability unit VIs-2).—About 75 percent of this soil is still under forest. A large part of the cleared acreage is used for pasture consisting of lespedeza and volunteer plants.

This soil is suited to cultivated crops, but stones and low fertility limit its usefulness. If adequately fertilized, fairly good yields of corn, small grains, tobacco, and vegetables can be obtained. This soil is suited to the less exacting hay and pasture plants. Although good pastures can be maintained, the control of weeds is difficult because of the stones.

Jefferson cobbly fine sandy loam, moderately steep phase (12 to 25 percent slopes) (Jd).—This soil occurs on foot slopes along the base of Chilhowee and Little

Mountains. In many places cultivation is impractical because of the cobbles. Most of the cobbles are angular.

This soil has a 10-inch surface layer of pale-brown to light yellowish-brown friable cobbly fine sandy loam. The underlying material is similar to that of Jefferson cobbly fine sandy loam, sloping phase, but the depth to bedrock is somewhat less. Included with this soil are areas of cobbly sandy loam.

This soil is low in fertility and organic matter. It is medium acid to strongly acid. It is permeable to roots, but its available moisture-holding capacity is limited.

Use and suitability (Capability unit VIs-2).—About 85 percent of the acreage is under forest; the rest is used mainly for crops or unimproved pasture. Because it is stony, strongly sloping, and low in fertility, this soil is poorly suited to crops. If adequately fertilized and limed, it can grow fair to good pasture. Most of the common pasture plants are suitable.

Leadvale silt loam, gently sloping phase (2 to 5 percent slopes) (La).—This soil is moderately well drained. It generally occurs on alluvial-colluvial foot slopes, benches, and fans below the adjacent Dandridge, Litz, and Sequoia soils. Most of its soil material fell or was washed from these associated soils. This soil has developed under a predominantly deciduous forest. Nearly all of the acreage is scattered in many small areas in the Dandridge-Whitesburg-Hamblen and Sequoia-Litz-Hamblen soil associations.

Profile description:

0 to 9 inches, yellowish-brown friable silt loam; moderate medium granular structure.

9 to 15 inches, brownish-yellow moderately firm silty clay loam; moderate fine blocky structure.

15 to 22 inches, brownish-yellow firm silty clay loam; moderate subangular blocky structure; few, fine, faint, yellow and gray mottles in lower part.

22 to 48 inches +, brownish-yellow, mottled with yellow and gray, firm silty clay; structureless (massive) or weak coarse blocky structure; contains a few blocky concretions; shale bedrock at depths of 3 to 10 feet.

This soil is low to moderate in fertility and contains little organic matter. It is medium acid to strongly acid. The surface layer is permeable to moisture, but the subsoil is firm enough to retard infiltration. The available moisture-holding capacity is moderate, and the lower subsoil is not very permeable to roots.

Use and suitability (Capability unit IIe-4).—Nearly all of this soil is used for crops or pasture. Corn, small grains, and hay crops are grown in rotation. In some sections tobacco is grown.

This soil is fairly well suited to most of the crops commonly grown. It is less well suited to alfalfa and other deep-rooted legumes than the Decatur, Dewey, and Dunmore soils.

Leadvale silt loam, eroded gently sloping phase (2 to 5 percent slopes) (Lb).—Because this soil is moderately eroded and therefore thinner than Leadvale silt loam, gently sloping phase, some of its surface soil and subsoil has been intermixed through tillage. Its surface soil contains slightly more clay than that of uneroded soil.

This soil occurs in small scattered areas throughout the shale belts of the county. Like the gently sloping phase, it occurs on foot slopes, benches, and fans below upland slopes that are occupied mainly by the Dandridge, Litz, or Sequoia soils. Below this soil in the narrow strips along the drainways, generally are the younger Whitesburg, Barbourville, or Hamblen soils.

The surface soil is a yellowish-brown friable silt loam about 6 inches thick. Beneath this is a brownish-yellow moderately firm silty clay loam. The material is mottled with gray and yellow below depths of 18 to 20 inches. Shale bedrock occurs at depths of 3 to 10 feet. This soil contains a few small weathered shale fragments in many places. Included are a few more severely eroded spots that have a surface soil of brownish-yellow moderately friable silty clay loam.

This soil is very low in fertility and in organic matter. It is strongly acid. It has a moisture content that is favorable for most crops except alfalfa and other deep-rooted legumes. During and after heavy rains the soil becomes saturated with water. Runoff is slow to medium, and internal drainage is rather slow. This soil is not well aerated below depths of 18 to 20 inches.

Use and suitability (Capability unit IIe-4).—This soil has been used for crops and pastures for many years. About 30 percent is in row crops, chiefly corn; 20 percent in small grains; 10 percent in other crops; and 35 percent in hay and pasture. About 5 percent is idle or in nonfarm use.

This soil is suited to crops and pasture. Under good management, including adequate fertilization, short rotations can be used. Most of the field crops, except possibly alfalfa, are fairly well suited to this soil. Yields are high if lime, phosphate, nitrogen, and possibly potash are applied in adequate amounts.

Leadvale silt loam, eroded sloping phase (5 to 12 percent slopes) (Lc).—This soil of the colluvial lands is moderately well drained. It rolled or was washed from uplands underlain largely by calcareous shale. It is similar to Leadvale silt loam, gently sloping phase, in distribution and association.

The surface soil is mainly yellowish-brown, moderately friable, heavy silt loam. The subsoil is yellow to brownish-yellow moderately firm silty clay loam. The depth of the colluvial deposit ranges from about 2 to 8 feet.

The degree to which this soil is eroded varies greatly within areas and from area to area. Included are small severely eroded spots from which all of the original surface soil has been removed, and in these places tillage is entirely in the subsoil. Most of the soil still retains enough of the original surface soil that tillage can be within that layer.

Use and suitability (Capability unit IIIe-4).—Nearly all of this soil has been cultivated for many years. It is used for a wide variety of crops and pasture plants. It cannot be used so intensively as Leadvale silt loam, gently sloping phase, and it needs longer rotations. It is suitable for moderately short rotations if it is adequately fertilized and otherwise well managed. All the field crops, except alfalfa and other deep-

rooted legumes, commonly grown are fairly well suited to this soil.

Lehew very fine sandy loam, very steep phase (45+ percent slopes) (Ld).—This upland soil is shallow and excessively drained. It has developed from the residuum of acid rocks—red, yellow, and brown sandstones, and red, brown, and green sandy shales. Few of the beds of sandstone are more than 2 or 3 feet thick, and they are not continuous for any great distance; they are repeatedly interbedded with shales. The shales are very thin, and small seams of sandstone are interbedded with them. Some of the shales have a pinkish or purplish color.

This soil normally occupies long linear ridges that have steep sides and narrow even crests. In this county, all the acreage occurs in a belt known locally as Bays Mountain. Here, one prominent ridge, with a few outlying ridges, rises in the vicinity of Rockford and continues eastward to the Sevier County line.

Profile description:

0 to 8 inches, reddish-brown very friable very fine sandy loam; upper 1½ inches stained dark by organic matter.
8 inches +, reddish-brown very friable very fine sandy loam; contains many soft fragments of sandstone and shale.

Bedrock generally occurs at a depth between 1 and 2 feet, but it is frequently at or near the surface. In some places on the crests of ridges, the depth to bedrock is as much as 2½ feet.

This soil is very low in organic matter and natural fertility and is strongly acid. Because of its shallow depth to bedrock it has a very low capacity to supply either water or nutrients that plants can use. What soil material there is, however, has good permeability to both roots and moisture. The south-facing slopes are more droughty than the north-facing slopes.

Use and suitability (Capability unit VIIs-1).—About 85 percent of this soil is still under forest. The forest stand is thin and consists of mixed hardwoods and pine. The cleared part is largely in unimproved pasture or idle.

This soil is poorly suited to either crops or pasture, and most areas probably should be used for forest. The few areas that have 20 and 30 percent slopes could possibly grow fair pasture if fertility is raised. Because of the scarcity of moisture, yields would be low.

Lindside silt loam (0 to 2 percent slopes) (Le).—This soil of the bottom lands is imperfectly drained. It consists of recent alluvium that was derived chiefly from limestone. It occurs on level or nearly level flood plains where most areas are likely to be flooded periodically. Most of the acreage is on the bottom lands along creeks and smaller streams that originate in or flow through limestone uplands.

This soil is widely scattered throughout all the limestone areas of the county. It is better drained than Melvin silt loam, with which it is associated. Along many of the smaller streams, this soil occupies the entire flood plain. Where the flood plain is broad, this soil is near the stream and strips of Melvin silt loam normally occur along the rim of the flood plain. A few small individual areas occur in saucerlike depressions.

Profile description:

0 to 14 inches, dark grayish-brown or dark-brown friable silt loam.
14 to 25 inches, dark-brown, friable, heavy silt loam; a few yellowish-brown mottles; mottles more numerous in lower part.
25 to 48 inches +, mottled grayish-brown, yellowish-brown, and gray heavy silt loam; gray color dominant in lower part; depth to limestone bedrock is generally more than 5 feet, but in some places it is as much as 40 feet.

This soil is one of the most fertile soils of the county, and it contains a moderately high amount of organic matter. It is generally medium acid to slightly acid. In some areas the reaction is nearly neutral. This soil is permeable, and it has a high capacity for holding water that plants can use. The water table is low. Tilth is generally good, but this soil is plastic in a few wet spots. Tillage operations and other fieldwork are sometimes delayed in spring by excessive moisture and at times during the growing season by heavy summer rains. Crops may be damaged by floods during the growing season. Because it is level, the soil is easily worked with heavy farm machinery.

Use and suitability (Capability unit IIw-1).—Nearly all of this soil has been cultivated. About 35 percent is used for corn, 10 percent for small grains, 30 percent for hay, 20 percent for rotation pasture, and 5 percent for miscellaneous crops.

This soil is suitable for intensive use for certain row crops. Because of its high available moisture supply, it is well suited to crops that require a long growing season. It is well suited to corn and soybeans, but not so well suited to tobacco and truck crops. The water table is apparently too high for alfalfa to be grown, and small grains commonly lodge. Because of its high fertility and favorable moisture content throughout a great part of the growing season, this soil is particularly well suited to hay and pasture crops. Although naturally fertile, it responds well to additions of fertilizer, but much of the acreage does not require lime.

Litz silt loam, sloping phase (5 to 12 percent slopes) (Lk).—This soil is shallow to acid shale bedrock. In most places the shale is soft and, apparently, leached of lime. In some places it contains a few thin layers or lenses of limestone. This soil normally occurs on short slopes below Sequoia soils that are on smoother slopes. It is associated with other Litz soils and the Sequoia soils. Much of the acreage is in the Sequoia-Litz-Hamblen soil association.

Profile description:

0 to 7 inches, light yellowish-brown or yellowish-brown friable silt loam containing some fine shale fragments.
7 to 15 inches +, strong-brown and brownish-yellow silty clay loam soil material mixed with soft shale fragments.

Fissile shale bedrock occurs at depths of 1 to 2 feet. Much of the shale is soft and easily crushed. In a few places it is moderately hard and more nearly pale yellow or pale olive than normal.

This soil is low in fertility and organic matter. It is permeable and moisture infiltrates readily, but, because it is shallow to bedrock, it can hold little moisture and runoff starts quickly during rains. The bedrock, however, does absorb more water than the limestone

bedrock. This soil is more droughty than many soils that are deeper to bedrock.

Use and suitability (Capability unit IIIs-1).—About 80 percent of this soil has been cultivated. Because it is shallow, rolling, and infertile, it is not well suited to row crops. Small grains, alfalfa, other preferred legumes and grasses can be grown if this soil is properly fertilized, limed, and seeded. Under good management, permanent pastures of orchardgrass and whiteclover have a fair carrying capacity, but these plants do not grow well during dry periods.

Litz silt loam, gently sloping phase (2 to 5 percent slopes) (Lh).—This soil is thinly distributed throughout the Sequoia-Litz-Hamblen soil association. It is slightly deeper to bedrock than Litz silt loam, sloping phase. Except for a small part that is still under forest, this soil is slightly eroded. In most places the plow layer is yellowish-brown or brownish-yellow friable silt loam. The depth to bedrock ranges from 1 to 2 feet.

This soil is low in fertility and organic matter. Chiefly because it is shallow, it has a low capacity to hold water that plants can use. The thin soil, however, is friable and permeable. Where the shale bedrock is near the surface, heavy tillage implements can break the bedrock enough for a tillable plow layer to be formed.

Use and suitability (Capability unit IIIs-1).—Much of this soil has been cultivated. About 40 percent is now used for crops, about 40 percent is in pasture, a very small part is in forest, and the rest is idle. Most of the cropped part is fertilized, and much of it has been limed. Yields of crops generally are low.

This soil is suited to only a narrow range of crops. If adequately fertilized, it is suited to small grains and to alfalfa, other legumes, and grasses. Corn or other row crops can be grown occasionally.

Litz silt loam, moderately steep phase (12 to 25 percent slopes) (Ll).—In most places this soil is shallower to shale bedrock than Litz silt loam, sloping phase. On the steeper parts, the shale outcrops in places.

The 5- to 6-inch surface soil is yellowish-brown friable silt loam. Below this layer is brownish-yellow shaly silty clay or shaly silty clay loam. The depth to bedrock ranges from 1 to 1½ feet.

This soil is low in fertility and contains little organic matter. It is medium acid to strongly acid. Even though this soil is permeable, runoff starts quickly during rains because the shallow soil material absorbs little water. The soil normally is droughty.

This soil occurs on some of the stronger slopes in association with other Litz soils and the Sequoia soils in the Sequoia-Litz-Hamblen soil association.

Use and suitability (Capability unit IVs-1).—About 80 percent of this soil has been cultivated. A large part is now in unimproved pasture, and 15 to 20 percent is used for general crops. Many areas are idle.

This soil is poorly suited to cultivated crops. If adequately fertilized, it grows fair pasture grasses and legumes. Because this soil is droughty, its carrying capacity is low. Close-growing plants are needed to protect this soil from erosion.

Litz shaly silty clay loam, eroded moderately steep phase (12 to 25 percent slopes) (Lg).—This soil is widely distributed throughout the Sequoia-Litz-Hamblen soil association. The soil material is predominantly of brownish-yellow very shaly silty clay loam. Shale bedrock generally occurs at depths of ½ to 1 foot, but in places the shale outcrops. In some places there are shallow gullies.

This soil is very low in fertility and in organic matter. It has a very low capacity to hold water that plants can use, although the shallow soil material absorbs moisture well.

Use and suitability (Capability unit IVs-1).—All of this soil has been cultivated. About 50 percent is now used for unimproved pasture, and probably about 30 percent is virtually abandoned or is idle. The rest is used for corn, small grains, and lespedeza. Fertilizer is not generally used on this soil, but lime has been applied in some places.

Because it is very shallow to bedrock and strongly sloping, this soil is poorly suited to crops. If adequately fertilized and limed and properly seeded, most of the acreage can grow fair stands of pasture grasses and legumes, including whiteclover, fescue, and orchardgrass. Because this soil is droughty, pasture plants that are drought resistant should be grown in some areas during much of the dry period.

Litz shaly silty clay loam, eroded sloping phase (5 to 12 percent slopes) (Lf).—This soil differs from Litz silt loam, sloping phase, mainly in having a shaly silty clay loam surface layer. It is widely distributed in small areas throughout the Sequoia-Litz-Hamblen soil association. Most of it occurs on short slopes of low-lying ridges below smoother areas of the Litz or Sequoia soils.

The soil material overlies acid shale bedrock. In places soft shaly bedrock is at the surface. Some areas have shallow gullies that normally can be filled by using ordinary tillage implements.

This soil is very low in fertility and organic matter. It is also very low in its capacity to hold water that plants can use.

Use and suitability (Capability unit IIIs-1).—All of this soil has been cultivated. A large part is now used for unimproved pasture, and about 30 percent is idle or abandoned. Virginia pines have revegetated many of the abandoned areas. Small grains, corn, lespedeza, and other crops are grown on about 30 percent of the acreage. Only a little fertilizer has been used.

This soil is rather poorly suited to the common row crops. It is better suited to close-growing crops and pasture. It this soil is adequately fertilized and otherwise well managed, pasture plants grow well. Nearly all of the common pasture plants can be grown. Yields of small grains are fair to good because the grain matures early when rainfall is normal.

Melvin silt loam (0 to 2 percent slopes) (Ma).—This soil of the bottom lands is poorly drained. It is widely distributed in small areas throughout the limestone belts of the county. It consists of young alluvium that was washed from uplands underlain by limestone.

In this county it was washed chiefly from Decatur, Dewey, Dunmore, and Talbott soils.

This soil is only a little higher than the normal level of the streams. Many areas, especially along the large streams, are in the depressions of old stream channels. Nearly all of this soil occurs in long strips on narrow bottoms along perennial streams where much water seeps from the adjacent upland slopes. Runoff and internal drainage are slow. The water table is near the surface most of the time; sometimes water covers the surface. The native vegetation was largely water-tolerant oak, willow, and sweetgum.

Profile description:

0 to 7 inches, grayish-brown friable silt loam.
7 to 27 inches, light brownish-gray or gray plastic silty clay loam or heavy silt loam.
27 inches +, gray and brownish-yellow plastic silty clay loam or heavy silt loam that continues to the fluctuating water table.

The soil is slightly acid and contains a moderate amount of plant nutrients and organic matter. If it is not saturated with water, it is fairly permeable to air, roots, and water. The high water table retards the growth of roots of many crops.

Use and suitability (Capability unit IIIw-1).—Nearly all of this soil is used for pasture or crops. Most of the acreage is in pasture; some is in crops, mainly corn. Average yields of corn are low, and the crop commonly fails. If the soil were drained, probably its use suitability would be broadened but it would still be largely suitable for only corn, soybeans, sorghum, and other summer annuals. Melvin silt loam is fairly well suited to pasture because it is moderately fertile and plants can grow during long dry periods.

Minvale silt loam, eroded gently sloping phase (2 to 5 percent slopes) (Mb).—This soil of the colluvial lands is well drained. It occurs in small, irregularly shaped areas throughout the limestone uplands. It normally occurs on foot slopes, fans, and benches immediately below the upland slope from which its parent material rolled or was washed. The parent material was transported mainly from the Dunmore soils. This soil is closely associated with Pace, Hermitage, and Greendale soils of the colluvial lands; Dunmore and Fullerton soils of the uplands; and Lindside and Melvin soils of the bottom lands. It has formed under a forest of oak and hickory with scatterings of tulip-poplar, maple, beech, sweetgum, and walnut.

Profile description:

0 to 8 inches, pale-brown or yellowish-brown friable silt loam.
8 to 16 inches, friable, heavy silt loam, mingled reddish yellow and pale brown, yellowish brown to brownish yellow when crushed.
16 to 29 inches, yellowish-red friable silty clay loam; moderately well developed medium blocky structure.
29 to 48 inches +, yellowish-red or reddish-yellow silty clay loam or silty clay, streaked or splotched with yellow and brownish yellow; firm to moderately friable; medium blocky structure.

In wooded areas organic matter has stained the upper 2 inches of this soil. Included are a few small uneroded areas.

469687—59——4

The soil is medium acid to strongly acid. It contains a moderately low amount of organic matter and plant nutrients. It absorbs water readily and has a medium to high capacity to hold moisture that plants can use. It is permeable to air, roots, and water throughout the profile. Runoff is slow and internal drainage is moderate. This soil contains only a few stones.

Use and suitability (Capability unit IIe-1).—Nearly all of this soil is used for crops and pasture; very little is idle. It is used fairly intensively for a wide variety of field crops and for pasture.

Partly because this soil responds well to fertilizer, it is well suited to crops and pasture. Liberal amounts of amendments are needed for high yields of alfalfa and red clover and for continued high yields of all crops. Because runoff is slow, management to prevent erosion is not exacting and this soil can be used in short rotations. Although fields are small, most farm machinery can be used on this soil because it is level or nearly level.

Minvale silt loam, eroded sloping phase (5 to 12 percent slopes) (Mc).—This soil of the rolling colluvial lands is well drained. It occurs in medium-sized and small, irregularly shaped tracts that are scattered along the foot slopes of hills that are occupied by Dunmore and Fullerton soils. Because it is more strongly sloping than Minvale silt loam, eroded gently sloping phase, it is eroded to a slightly greater degree.

The surface soil is pale-brown to yellowish-brown heavy silt loam about 3 to 7 inches thick. It has been mixed with the upper part of the surface soil in places. The subsoil is yellowish-red moderately friable silty clay loam. The colluvial deposit is normally more than 5 feet deep. It is underlain by limestone in nearly all places.

Included with this soil are about 23 acres that are not eroded. Because their soil boundaries are indistinct, small areas of the adjacent soils are also included.

This soil is low in organic matter and plant nutrients, but it responds well to amendments. It is medium acid to strongly acid, has good tilth that is easy to maintain, and is easy to work and to conserve.

Use and suitability (Capability unit IIIe-1).—Nearly all of this soil is cultivated. It is used for a wide variety of crops and for pasture. Very little is idle.

This soil responds well to amendments and is physically suited to crops and pasture. Nearly all crops common to the county grow well, including alfalfa, tobacco, and truck crops. This soil cannot be used so intensively as Minvale silt loam, eroded gently sloping phase, and it needs longer rotations that include more close-growing crops. It can, however, be tilled over a wide range of moisture content.

Montevallo shaly silt loam, moderately steep phase (12 to 25 percent slopes) (Md).—This soil is very shallow to soft, acid shale bedrock that is variegated but dominantly light colored. It differs from the Litz soils primarily in being lighter colored, shallower to bedrock, and less fertile. It generally occurs next to the Sequoia and Litz soils of the uplands and the Muse

and Leadvale soils of the colluvial lands. In places it is separated from these soils by outcrops of limestone. A large part of this soil occurs in a belt just north of Maryville that extends northward to Knox County. This belt is parallel to Bays Mountain and in some places is next to the mountain.

Included with this soil are narrow ridge crests that generally have 5 to 12 percent slopes.

Profile description:

0 to 7 inches, light brownish-gray friable shaly silt loam; contains many small, soft shale fragments.
7 inches +, predominantly greenish and grayish silty shales with a small admixture of light brownish-gray soil material; soft, leached bedrock extends to a depth of several feet.

In undisturbed areas the upper 1½ inches of this soil is stained with organic matter. In some places the soft, leached bedrock occurs at a depth of 12 inches.

This soil is strongly acid and very low in fertility and organic matter. Because it is shallow and contains a large amount of shale fragments, it cannot absorb and hold much water and therefore is extremely droughty. The bedrock can be easily broken with ordinary tillage implements.

Use and suitability (Capability unit IVs-1).—About 85 percent of this soil has been cropped; the rest is under a mixed pine and hardwood forest. A large part of the cleared acreage is used for unimproved pasture. Many abandoned areas have reverted to Virginia pine. A small acreage is used for corn, small grains, lespedeza, and other crops.

Because it is strongly sloping, shallow, droughty, and difficult to conserve, this soil requires extremely careful management including long rotations if it is used for cultivated crops. It is fairly well suited to pasture, but some areas can be best used for forest. Shortleaf pine is suitable for reforestation.

Montevallo shaly silt loam, steep phase (25 to 50 percent slopes) (Me).—This soil is very shallow to acid shale bedrock. Probably 90 percent of it occurs in a narrow linear belt adjacent to Little Mountain, where it is associated with the Ramsey soils. A small acreage occurs along the foothills of Bays Mountain, where it is associated with the Lehew soils.

The upper 5 or 6 inches is light brownish-gray shaly silt loam. Beneath this is light brownish-gray soil material mixed with soft shale fragments. The leached or soft bedrock occurs at depths of 8 to 12 inches, but in many places bedrock outcrops. Where the bedrock is exposed, it rapidly disintegrates into fine shale fragments.

Use and suitability (Capability unit VIs-1).—All except 98 acres of this soil is still under forest. The forest has been cut over many times, and only a thin stand of mixed pine and hardwoods remains. The cleared acreage is either in unimproved pasture or is idle.

Chiefly because it is steep, droughty, and low in fertility, this soil requires very careful management if used for pasture. It is probably best suited to forestry.

Muse silt loam, eroded gently sloping phase (2 to 5 percent slopes) (Mh).—This soil of the old colluvial lands is deep and well drained. It has a light-colored surface soil and a reddish subsoil. It normally occurs in narrow strips on foot slopes, benches, and fans immediately below upland slopes that are underlain by slate or shale. Its parent material rolled or was washed from these upland slopes. This colluvium has been in place long enough for a moderately strong soil horizon to develop.

A large part of this soil is in the Sequoia-Litz-Hamblen soil association. Small scattered areas occur throughout the shale belts of the county. A few areas that developed from slates are in the mountain coves.

This soil is more strongly developed than the associated Barbourville soils, which commonly occur along the drainways below it. It occurs in positions similar to those of the Leadvale soils and on similar parent material. This soil, however, differs from the Leadvale soils in having a reddish instead of a yellowish subsoil and in being better drained.

Profile description:

0 to 8 inches, yellowish-brown very friable silt loam.
8 to 12 inches, brownish-yellow to yellowish-brown friable silt loam; moderate fine blocky structure.
12 to 28 inches, strong-brown or reddish-yellow friable silty clay loam; moderate medium blocky structure.
28 to 48 inches +, strong-brown friable silty clay loam; a few brownish-yellow variegations; moderate medium subangular blocky structure.

Most areas of this soil are underlain by residuum of shale or slate at depths of 3½ to 8 feet. The depth of the surface soil ranges between 6 and 10 inches. In spots a small amount of subsoil material has been mixed with the original surface soil through tillage.

This soil is strongly acid and moderately low in organic matter. It is low in nitrogen, phosphorus, potassium, and calcium. It absorbs water rapidly and has a rather high capacity to hold water that plants can use. It is permeable to roots and is well aerated. It has favorable tilth, is easy to work, and is not difficult to conserve. The moisture content of this soil is increased by runoff and seepage water from adjacent slopes.

Use and suitability (Capability unit IIe-1).—Nearly all of this soil is used for crops and pasture. The most common crops are corn, small grains, and lespedeza. A small acreage is used for tobacco. This soil can be safely used in a short rotation. If it is adequately fertilized, high yields of crops and pastures of high carrying capacity can be obtained.

Muse silt loam, eroded sloping phase (5 to 12 percent slopes) (Mk).—This soil of the old colluvial lands is deep and well drained. It occurs on benches and fans of local alluvium or colluvium that rolled or was washed from uplands underlain mainly by slate and shale. Because of its stronger slopes, it is eroded to a slightly greater degree than is Muse silt loam, eroded gently sloping phase, and its surface soil contains more subsoil material that has been mixed through tillage. The plow layer of most of this soil, however, still consists largely of the original surface soil.

This soil normally has a 6-inch surface soil of yellowish-brown friable silt loam. Beneath this is a strong-brown or reddish-yellow friable silty clay. Most areas are underlain by shale or slate at depths of 3 to

8 feet. The more severely eroded spots have a reddish surface layer that is finer textured than that of the rest of this soil.

This soil occurs largely in the Sequoia-Litz-Hamblen soil association. A few areas in the mountain coves are associated with the Jefferson, Hayter, and Allen soils. A very small acreage is associated with the Dandridge soils.

This soil is moderately low in fertility and organic matter and is strongly acid. It is permeable to roots, air, and moisture. It has a moderately high capacity to hold water that plants can use. The moisture relations of many areas are improved by runoff and seepage from adjacent higher upland slopes. Except on a small severely eroded acreage, tilth is good and the soil is easy to work.

Use and suitability (Capability unit IIIe-1).—About 95 percent of this soil has been cultivated. The rest is in a dominantly deciduous forest. About 30 percent is used for corn and small grains; 30 percent for hay, chiefly lespedeza, timothy, and red clover; 25 percent for pasture; and 15 percent for tobacco, vegetables, and similar crops. A few areas are idle.

This soil is well suited to the common row crops and hay and pasture. It is well suited to alfalfa. It cannot be used so intensively as Muse silt loam, eroded gently sloping phase. A 3- or 4-year rotation of a row crop, small grain, and hay or pasture is suitable. In this rotation the hay or pasture should be grown for 1 or 2 years. If the soil is adequately fertilized, pastures of high quality and high carrying capacity can be maintained.

Muse silt loam, eroded moderately steep phase (12 to 25 percent slopes) (Mg and Ml).—This is the least extensive Muse soil. It has thinner soil horizons than Muse silt loam, eroded gently sloping phase, and is shallower to residuum of shale or slate.

The upper 5 or 6 inches is yellowish-brown friable silt loam. The underlying material is friable silty clay loam. This layer normally is reddish yellow or strong brown, but in some places it is yellowish red. The depth to residuum of shale or slate ranges from 2 to 5 feet. Some included areas have had most of the original surface layer washed away, and the present surface layer is reddish silty clay loam.

Use and suitability (Capability unit IVe-1).—All except 12 acres of this soil has been cultivated. A large part is used for unimproved pasture, mainly lespedeza and volunteer plants. About 15 to 20 percent is idle. A few areas are used for corn and small grains.

This soil is suited to all crops commonly grown in the county. It is suitable for rotations of hay or pasture and row crops, provided a row crop is grown only once every 5 or 6 years.

Neubert loam (2 to 5 percent slopes) (Na).—This well-drained soil occurs on local alluvium. The alluvium was washed chiefly from Tellico soils that were derived from calcareous sandstone or shaly sandstone. Nearly all of this soil lies on narrow strips along the drainways in the Tellico-Alcoa-Neubert soil association.

Profile description:

0 to 15 inches, reddish-brown to dark reddish-brown friable loam.
15 to 36 inches +, reddish-brown or dark-brown to red loam to clay loam that is generally somewhat firmer than layer above.

The depth to bedrock ranges from 3 to 12 feet. In places the material below a depth of 24 inches is mottled reddish brown, yellow, and gray. From place to place the surface soil and subsoil vary in texture. Included are areas that have a surface soil as coarse textured as fine sandy loam. In other areas the surface soil is nearly a silt loam.

This soil is moderately fertile and contains a fairly large amount of organic matter. It is medium acid to slightly acid. It has good tilth and a fairly high capacity to hold water that plants can use. The deep subsoil is moist much of the time, and during heavy rains parts are temporarily flooded. Crops, however, are never badly damaged and are seldom damaged at all. Tilth is good, and most of this soil can be cultivated over a wide range of moisture content. Crops on this soil respond well to fertilizer.

Use and suitability (Capability unit I-1).—Much of this soil is cultivated, some of it intensively. The only parts still under forest are in the extreme upper reaches of the drainways in the steeper parts of the Tellico-Alcoa-Neubert soil association. About 25 percent of the acreage is in corn, 25 percent is in hay, and 25 percent is in pasture. A small acreage is used for small grains and tobacco. Some areas are fertilized.

Most of this soil is very well suited to a wide variety of crops and pasture plants. If adequately fertilized, it can be used intensively for row crops. The less well drained parts are not well suited to tobacco, alfalfa, or potatoes. Unless it is reseeded, alfalfa does not last for many years. If this soil is adequately fertilized, the better legumes and grasses produce good pasture. Because its available moisture-holding capacity is high, this soil is valuable for pasture during the drier parts of the growing season.

Pace silt loam, gently sloping phase (2 to 5 percent slopes) (Pa).—This soil of old colluvial lands is moderately well drained. It occurs on foot slopes, benches, and fans below the Dunmore and Fullerton soils and above strips of younger Greendale soils that lie along the drainways. Its parent material rolled or was washed chiefly from the Dunmore and Fullerton soils. This soil occurs in positions similar to those of the Minvale soils and on similar parent materials. It differs from the Minvale soils in having a yellowish subsoil and in being less well drained.

Most of the acreage occurs in the Dunmore-Pace-Greendale soil association. Some is in the Dewey-Decatur-Dunmore soil association.

Profile description:

0 to 9 inches, yellowish-brown very friable silt loam; moderate medium to fine granular and crumb structure.
9 to 12 inches, yellowish-brown friable heavy silt loam or silty clay loam; weak fine subangular blocky structure.
12 to 25 inches, brownish-yellow to yellowish-brown friable silty clay loam; weak medium and fine subangular blocky structure.

25 to 48 inches +, light yellowish-brown friable silty clay loam; many gray mottles; weak structure or structureless (massive); layer compact and brittle in places; limestone bedrock at depths of 5 to 12 feet.

This soil is medium acid to strongly acid. It is low in organic matter and fertility. It has a medium capacity to hold water that plants can use. The surface soil and the upper part of the subsoil are permeable to air, moisture, and roots, but the substratum is fairly compact and retards the movement of air and moisture. Runoff is slow, and internal drainage is moderate to moderately slow. This soil has good tilth and is easy to work.

Use and suitability (Capability unit IIe-1).—Nearly all of this soil is cultivated. About 20 percent is used for corn; 20 percent for hay, mostly lespedeza; 15 percent for small grains; and 25 percent for pasture. The rest of the cultivated acreage is in tobacco, vegetables, and other crops. Only a very small part of this soil is idle.

If adequately fertilized, this soil is suited to most of the row crops commonly grown, and to small grains, red clover, white clover, lespedeza, timothy, orchardgrass, fescue, and other legumes and grasses. Short rotations can be used. Use suitability, however, is somewhat limited by the moderately slow internal drainage. Alfalfa is not a suitable crop, because it does not last long, even if this soil is adequately fertilized and otherwise well managed.

Pace silt loam, eroded sloping phase (5 to 12 percent slopes) (Pb).—This soil of colluvial lands is moderately well drained. It occurs on benches and fans in local alluvial or colluvial materials that rolled or was washed mainly from the Dunmore and Fullerton soils. Most of the acreage is moderately eroded, and small amounts of the subsoil material have been mixed with the surface soil through tillage.

The 6- to 7-inch plow layer normally is yellowish-brown friable silt loam. The subsoil is brownish-yellow to yellowish-brown friable silty clay loam. Below depths of 20 to 24 inches the material is mottled with gray. In some areas this layer is a weakly developed pan. A few of the more strongly sloping exposed spots have a yellowish-brown heavy silt loam surface soil. Limestone bedrock occurs at depths of 4 to 10 feet.

This inextensive soil occurs in small, thinly scattered areas throughout the Dunmore-Pace-Greendale soil association. A few areas occur in the Dewey-Decatur-Dunmore soil association.

This soil is very low in natural fertility and organic matter. It is strongly acid. The upper part of the soil is permeable, but below depths of 20 to 24 inches the movement of moisture and air is retarded. This soil has good tilth and is easy to work.

Use and suitability (Capability unit IIIe-1).—Except for alfalfa, all crops commonly grown in the county are suitable for this soil. Even under good management, alfalfa does not last long, because drainage is inadequate. A suitable rotation is a row crop, a small grain, and then hay or pasture for 1 or 2 years. Unless this soil is heavily fertilized, yields of all crops are low.

Prader silt loam (0 to 2 percent slopes) (Pc).—This poorly drained soil of the bottom lands occurs on young alluvium that was washed mainly from soils derived from shale or slate. The alluvium contains a small admixture of limestone material in places, and along some streams it contains a small amount of sandstone materials. Many areas of this soil are only slightly higher than the normal level of the streams. Some areas are slightly depressional and appear to be former stream channels. The native vegetation was largely water-tolerant oak, willow, maple, and sweetgum.

A large part of the acreage is along small perennial streams that flow through or originate in shale, slate, or sandstone uplands. Some areas are along the Little River. On the broad flood plains, the soil commonly occurs along the rim of the plain in association with the Hamblen and Staser soils, which are nearer the streams. Some areas lie adjacent to the Whitwell soils, which occur on low terraces.

Profile description:

0 to 8 inches, grayish-brown or dark yellowish-brown friable silt loam.
8 inches +, light-gray or light brownish-gray friable or firm heavy silt loam to silty clay loam that extends to the fluctuating water table.

The alluvium is normally more than 5 feet deep, and in places it is as deep as 20 feet or more. In some places the surface soil is faintly mottled with gray and yellow. About 100 acres of this soil has a surface soil that is almost black. A large part of this variation occurs in the west end of Cades Cove.

This soil is slightly acid and moderately fertile. It contains a moderate amount of organic matter. The water table fluctuates from a level at or near the surface during wet periods to several feet below the surface during prolonged dry periods. The high water table generally restricts the growth of roots to the upper part of the soil. Because the soil is waterlogged during much of winter and spring, the preparation of seedbeds and planting are frequently delayed. Most areas are likely to be flooded at times.

Use and suitability (Capability unit IIIw-1).—Nearly all of this soil is cultivated. Corn is the most extensive crop. Soybeans are grown on a small acreage. About 60 percent of this soil is used for pasture, but in most places the pasture is poor.

This soil is well suited to fescue, redtop, white clover, Ladino clover, and other water-tolerant pasture plants. Because it is poorly drained, normally it is not well suited to crops. It would be better suited to crops and pasture if it were artificially drained. Because it remains moist during dry periods, it can be used gainfully for supplemental pasture.

Ramsey slaty silt loam, steep phase (25 to 50 percent slopes) (Ra).—This shallow soil occurs on residuum of slate on steep mountain slopes, much of it on gradients between 35 and 50 percent. A small acreage is on narrow ridge crests on slopes of less than 35 percent, but it has little value for farming. Large areas lie on steep mountain outliers and around the rims of coves. This soil is associated with very steep areas of Ramsey soils and with small areas of Hayter, Barbourville, Allen, and Hamblen soils.

Profile description:

0 to 2 inches, grayish-brown or dark grayish-brown friable slaty silt loam.
2 to 9 inches, pale-brown or yellowish-brown friable slaty silt loam.
9 inches +, partly weathered slate fragments and yellowish-brown or brownish-yellow friable silt loam soil material.

Slate bedrock normally occurs at depths of 6 to 18 inches, but ledges of slate outcrop in many areas. In many places seams of sandstone or quartzite are interbedded with the slate; here the soil contains more sand than normal.

This soil has moderate natural fertility and is medium acid. Water percolates rapidly through the soil, and some is absorbed by the underlying slate beds, particularly the soft, leached part. Because this soil is shallow and steep, however, it holds little water that plants can use. Moisture relations normally are more favorable on the north-facing slopes than they are on the south-facing slopes.

Use and suitability (Capability unit VIIs-1).—Nearly all of this soil is under a forest of hardwoods mixed with some pine. Most of the small cleared acreage is in Happy Valley. Nearly all of the cleared areas are used for unimproved pasture; some are reverting to forest. This soil is poorly suited to crops or pasture. It is probably best suited to forestry.

Ramsey slaty silt loam, very steep phase (50+ percent slopes) (Rb).—This soil occurs in a rugged mountainous landscape that has steep-walled V-shaped valleys, sharp peaks, and narrow broken ridge crests. It makes up a large part of the mountainous area of the county. It is shallower to slate bedrock than Ramsey slaty loam, steep phase. Ledges of slate outcrops are common.

Use and suitability (Capability unit VIIs-1).—All of this soil is now under a forest of mixed hardwoods and pine. It is not suited to crops or pasture and should be kept in forest.

Ramsey stony fine sandy loam, very steep phase (50+ percent slopes) (Rc).—This soil is shallow to bedrock of sandstone and quartzite. Nearly all of it is on Chilhowee and Little Mountains. Outcrops of bedrock and loose stones more than 1 foot in diameter are common.

Profile description:

0 to 7 inches, yellowish-brown very friable stony fine sandy loam.
7 inches +, yellowish-brown or brownish-yellow friable sandy loam soil material mixed with fragments of sandstone and quartzite.

The depth to bedrock generally is between 12 and 18 inches, but in places it is as much as 2½ feet. Included with this soil is a small acreage on narrow ridge crests that has slopes of less than 50 percent gradient.

This soil is low in fertility and in organic matter. It is strongly acid.

Use and suitability (Capability unit VIIs-1).—Nearly all of this soil is under a cutover forest of mixed pine and hardwoods. Because it is very steep, shallow, and stony, its best use is for forestry.

Rockland, limestone, sloping (5 to 12 percent slopes) (Rd).—This land type occurs in areas that consist mainly of outcrops and loose fragments of limestone. In places a small amount of clayey soil material has formed. Because the soil material is thin and in such small patches, not enough vegetation grows for the land to be used for pasture. The forest consists of cedar and scrubby deciduous trees.

Most of this land is in small areas. It is associated chiefly with Talbott soils. A few areas are associated with the Dewey, Decatur, and Farragut soils. This land is of no value for crops and of very little value for pasture. Capability unit VIIs-1.

Rockland, limestone, moderately steep (12 to 50 percent slopes) (Re).—This land type occurs in areas that consist mainly of outcrops and loose fragments of limestone. In places a small amount of clayey soil material has formed between the outcrops. Because the soil material is thin and in such small patches, not enough vegetation grows for the land to be used for grazing. The forest consists of cedar and scrubby deciduous trees.

Most of this land is associated with the Talbott and Colbert soils. A few areas are associated with the Farragut, Dunmore, Dewey, and Decatur soils. This land is of no value for crops and of little or no value for pasture. Capability unit VIIs-1.

Rockland, slate or quartzite, steep (40 to 75 percent slopes) (Rf).—This land type occurs in areas that consist mainly of outcrops of slate or quartzite. In places a small amount of soil material has formed between the outcrops. Because the soil material is thin or in such small patches, little vegetation grows. The native vegetation of most of this land is scrubby mixed deciduous and pine trees. A large part of the acreage occurs on the steep mountain slopes adjacent to the Little River. This land type has no value for crops or pasture. Capability unit VIIs-1.

Sequatchie fine sandy loam (1 to 3 percent slopes) (Sb).—This soil of low terraces, or second bottoms, is well drained. It occurs on almost level plains in general mixed alluvium that was derived largely from sandstone. This soil lies along many perennial streams of the county and in mountain coves. Much of it is along the Little River.

Profile description:

0 to 11 inches, brown or yellowish-brown very friable or loose fine sandy loam.
11 to 38 inches, yellowish-brown friable loam or sandy clay loam.
38 inches +, yellowish-brown to strong-brown friable sandy clay loam with some gray and yellow mottles.

In some places beds of coarse sand or gravel occur at various depths below 36 inches. The depth to bedrock is normally between 7 and 20 feet. About 100 acres have a large amount of gravel and cobbles on the surface. Most of this acreage is difficult to work.

This soil is moderately fertile. It contains a fairly low amount of organic matter and is medium acid. It is well drained and very permeable. This soil can be safely tilled over a wide range of moisture content. Because it is sandy and porous its available moisture-holding capacity is fairly low and water percolates rapidly through the soil. Its low-lying position, however, tends to improve moisture conditions. Tilth is ex-

ceptionally good. Except on the gravelly and cobbly areas, this soil is easy to work and conserve.

Use and suitability (Capability unit I-1).—Nearly all of this soil is cultivated. Many kinds of crops are grown. Corn, small grains, and lespedeza are the most extensive crops. Very little of this soil is idle.

If adequately limed and fertilized, this soil is well suited to nearly all crops commonly grown in the county. Because it is coarser textured than other Sequatchie soils and therefore holds less moisture and plant nutrients, it is less productive than these soils. The moisture supply, however, is normally adequate because of the position of this soil on level alluvial plains. This soil is only slightly susceptible to erosion and can be used in short rotations. Some of the more nearly level areas are suited to intensive use.

Sequatchie loam (1 to 3 percent slopes) (Sc).—This nearly level soil of low stream terraces is deep and well drained. It occurs in alluvium that was derived from sandstone, shale, slate, limestone, and other materials. This soil lies along nearly all of the major streams of the county, much of it along the Little River. Other small areas occur along many smaller perennial streams.

This soil is associated mainly with the Staser and Whitwell soils. It is better drained than Whitwell loam and is older and somewhat more strongly developed than the Staser soils.

Profile description:

0 to 12 inches, dark-brown to dark grayish-brown very friable loam.
12 to 36 inches, yellowish-brown or strong-brown very friable light clay loam.
36 inches +, yellowish-brown or strong-brown friable clay loam faintly mottled with gray and yellow; alluvial deposits are 7 to 20 feet thick.

This is one of the most fertile soils of the county. It has good tilth and is easy to work and conserve. Because it is nearly level, runoff is slow and erosion is not a problem. This soil is very permeable and has a high capacity to hold water that plants can use. It is well aerated, and roots grow well.

Use and suitability (Capability unit I-1).—All of this soil is cultivated. Corn is the most common row crop; small grains and hay are extensively grown. Very little of this soil is idle.

Because this soil is nearly level, has favorable moisture relations, and responds well to fertilization and other management, it is one of the most suitable soils of the county for crops. It is suited to tobacco, vegetables, alfalfa, and many other crops. If this soil is kept fertile, it can be used in short rotations or even intensively. It is well suited to pasture legumes and grasses.

Sequatchie silt loam (1 to 3 percent slopes) (Sd).—This soil of the low stream terraces is deep and well drained. It has developed in mixed alluvium that was derived from slate, shale, sandstone, and limestone. It occurs throughout the county along many of the perennial streams. Some is in the mountain coves.

This soil is associated with the Staser soils and Whitwell loam and, in many places, occurs adjacent to these soils. It is older and somewhat more strongly developed than the Staser soils and better drained than Whitwell loam.

Profile description:

0 to 12 inches, grayish-brown to brown very friable silt loam.
12 to 36 inches, yellowish-brown or strong-brown friable clay loam or light silty clay loam; weak fine blocky structure.
36 inches +, yellowish-brown or strong-brown light silty clay loam; has a few gray and yellow mottles.

Bedrock generally occurs at depths of 6 to 20 feet. In some places the surface layer is very dark grayish brown.

This relatively fertile soil contains a moderate amount of organic matter and is about medium acid. It is very permeable throughout its profile and is well drained and well aerated. Tilth is good, and the soil is easy to work and conserve. There is little risk of erosion. This soil absorbs water rapidly and has a high capacity to hold moisture that plants can use. Most areas of this soil are at least 2 feet higher than the flood plain, but some areas are likely to be flooded at times of exceptionally high water.

Use and suitability (Capability unit I-1).—All of this soil is cultivated. It is used for all crops commonly grown. Corn is the most extensive row crop. Alfalfa, red clover, timothy, and other hay crops are extensively grown. Very little of this soil is idle.

Because this soil is almost level, permeable, relatively fertile, and favorable in moisture relations, it is well suited to crops. If it is kept fertile, it is suitable for short rotations or even intensive use.

Sequoia silty clay loam, eroded gently sloping phase (2 to 5 percent slopes) (Sf).—This soil of the uplands is moderately deep and well drained. In many places it is similar to the Talbott soils in the upper 16 to 20 inches. The lower part of this soil, however, is shaly, whereas the lower part of the Talbott soils is silty clay that was derived from limestone.

The soil is chiefly associated with Litz soils. In many places it occurs on smooth ridgetops adjacent to the Litz soils that are on the slopes below. Most of this soil is in the Sequoia-Litz-Hamblen soil association.

Profile description:

0 to 6 inches, yellowish-brown friable silt loam.
6 to 12 inches, strong-brown firm silty clay loam.
12 to 31 inches, yellowish-red firm silty clay; strong coarse blocky structure.
31 inches +, yellowish-red silty clay soil material mixed with weak partly disintegrated yellow and brown shale fragments.

The depth to leached or acid shale bedrock ranges from 2 to 4 feet. In forested areas that have never been cleared, the upper inch of soil contains a large amount of organic matter and is dark grayish brown. The subsoil in a few places is yellowish brown instead of yellowish red. The thickness of the two layers below the surface layer varies from place to place. In some places these two layers do not extend to a depth of more than 20 inches. In many places a few shale fragments occur in the lower part of the 12- to 31-inch layer.

This soil is low in fertility and organic matter, but it responds well to fertilizer. It is medium acid to

strongly acid. The surface layer is permeable and has good tilth. The subsoil is slowly permeable to moisture, but internal drainage is adequate for the growth of all crops. The available moisture-holding capacity is less than that of Emory silt loam, gently sloping phase, Sequatchie silt loam, and other more productive soils.

Use and suitability (Capability unit IIe-4).—Nearly all of this soil is cultivated. About 10 percent is still under forest. This soil is well suited to most general farm crops, including alfalfa and tobacco. Some of the more permeable, well-drained parts are better suited to truck crops than most of this soil. Crops can be grown in moderately short rotations. Nearly all of the better legumes and grasses can be grown for hay and pasture. If this soil is well fertilized, yields are high.

Sequoia silty clay loam, eroded sloping phase (5 to 12 percent slopes) (Sg).—This soil occurs in large areas on the slopes of the low ridges in the Sequoia-Litz-Hamblen soil association. It is generally shallower to the shale bedrock than is Sequoia silty clay loam, eroded gently sloping phase.

The 5-inch plow layer consists of yellowish-brown silty clay loam. The subsoil is predominantly yellowish-red or yellowish-brown firm silty clay. With increasing depth, the subsoil is transitional to mottled reddish-yellow and gray very firm silty clay that contains a variable amount of partly disintegrated shale fragments. Bedrock of leached or acid shale occurs at depths of 1½ to 2½ feet.

This soil is low in fertility and contains little organic matter. Its tilth is generally poor; in the more severely eroded spots it is very poor. Because slopes are moderately strong and the clayey subsoil retards infiltration, runoff starts quickly during rains. The available moisture-holding capacity is low, and this soil is rather droughty during the drier parts of the growing season.

Use and suitability (Capability unit IIIe-4).—Most of this soil has been cultivated; about 12 percent remains in forest. About 15 percent of the total acreage is used for corn, 10 percent for small grains, 25 percent for hay, and 25 percent for pasture. Much of the rest is idle. Fertilizers are used for the row crops and small grains. Lime has been applied to much of the acreage. Crop yields are not high.

This soil is suitable for most of the general field crops. Because of the strong slopes and moderately slow permeability, it is not suitable for intensive use, and for the most part is not suited to truck crops. If carefully managed and adequately fertilized, small grains and the preferred legumes and grasses, including alfalfa, grow well. Because this soil is somewhat droughty, yields of late-maturing crops are low and the growth of pasture plants is retarded during the drier parts of the growing period.

Sequoia silty clay, severely eroded sloping phase (5 to 12 percent slopes) (Se).—This soil occurs in areas that used to be Sequoia silty clay loam, eroded sloping phase, but these areas have lost all of their surface soil and, in places, part of their subsoil through erosion. Much of the acreage lies in small areas or in narrow strips on the slopes of the low ridges that are occupied by more nearly level Sequoia soils. Most of this soil is in the Sequoia-Litz-Hamblen soil association.

The plow layer consists of yellowish-red or yellowish-brown firm silty clay. The underlying material is transitional to variegated or mottled reddish-yellow, yellowish-red, and gray very firm silty clay. Shale bedrock occurs at depths of ½ to 2 feet. In some places, the shaly material outcrops. Shallow gullies are common in some of the more sloping parts, but most of them can be filled through deep tillage.

This soil is low in fertility and has very poor tilth. It is droughty because moisture infiltrates very slowly, and the soil has a very low capacity to hold water that plants can use. If this soil is cultivated, much soil material is lost because runoff develops quickly during rains.

Use and suitability (Capability unit IVe-4).—All of this soil has been cultivated but much of it is now idle. Some is used for unimproved pasture, and a very small part is cropped. Little fertilizer is used, and yields are low.

This soil is poorly suited to crops. If properly fertilized and seeded, it produces a fair amount of pasture, but the plants are stunted because of droughtiness. This soil probably could be made more suitable for plants by tilling deeply to break the shaly material. The heavy machinery required, however, is expensive to operate.

Staser fine sandy loam (0 to 2 percent slopes) (Sh).—This level or nearly level soil of the bottom lands is deep and well drained. It typically occurs in narrow, elongated strips adjacent to large streams. Nearly all of it is likely to be flooded at times. This soil consists of recent alluvium that was washed mainly from sandstone but partly from slate, shale, and limestone. Much of it contains coarse sediments that were deposited by mountain streams.

This soil is associated mainly with Hamblen and Sequatchie soils. It differs from the Hamblen soils in being better drained. It differs from the Sequatchie soils in being younger and in having little or no horizon development.

Profile description:

0 to 27 inches, yellowish-brown and, in places, brown very friable fine sandy loam; loose when dry.
27 inches +, yellowish-brown to dark yellowish-brown very friable fine sandy loam to loam.

This soil is commonly stratified. In some places gravelly layers occur below a depth of 30 inches. In a few places a layer that is darker than normal occurs below 18 inches. This layer appears to be an old surface layer that was buried by coarse sediments.

This soil is medium acid. It contains a moderate amount of organic matter and is moderately fertile. Sediments from overflow tend to maintain fertility, but because this soil is sandy it is not so fertile as are Staser loam and Staser silt loam. However, it responds well to fertilizer. This soil is very permeable and has good tilth. Although it can be cultivated over a very wide range of moisture content, its tilth is impaired if it is worked when it is too wet. Because it is porous

and water percolates readily, its available moisture-holding capacity tends to be low. The low-lying position in the landscape and the level surface, however, somewhat offset this factor. The moisture supply is normally adequate for the growth of most crops.

Use and suitability (Capability unit I-1).—All of this soil is cultivated. Much of it is used intensively for row crops. Probably 50 percent of the acreage is in corn; about 30 percent is in hay; and the rest is in small grains, pasture, and truck crops.

This soil is suited to intensive use. It is especially valued for row crops because much of it occurs where land suited to intensive use is scarce. Corn, tobacco, vegetables, small grains, and the common hay crops grow well. The soil may be flooded occasionally, but flooding normally lasts only a few hours and generally is not a serious problem.

Staser loam (0 to 2 percent slopes) (Sk).—This soil of the bottom lands is deep and well drained. It occurs in narrow elongated tracts along rivers and streams. It consists of recent alluvium that was derived from shale, slate, sandstone, limestone, and other rocks. Much of it is along the Little River, Ninemile Creek, and Sixmile Creek. Most areas of this soil are likely to be flooded at times.

This soil is mainly associated with the Hamblen and Sequatchie soils. It is better drained than the Hamblen soils and is less well developed than the Sequatchie soils. It is also associated with the poorly drained Prader silt loam, which is near the rims of the flood plains.

Profile description:

0 to 24 inches, brown or dark grayish-brown very friable loam.
24 inches +, brown, yellowish-brown or dark grayish-brown very friable loam; some gray mottles below depths of 30 to 36 inches; depth to bedrock is less than 5 feet in only a few places.

In some places a layer that is darker colored than the rest of the profile occurs at depths of 12 to 20 inches. This layer probably is an old surface layer that has been covered by recent deposits. In a few areas this soil is redder than elsewhere. In these areas some of the alluvium was washed from Tellico soils. The areas along Little Tennessee River have mica flakes throughout their profiles because a notable amount of alluvium was washed from highly micaceous soils in the mountain region south of Blount County. Generally, the areas along the Little River are darker colored than those along the creeks.

This soil is highly fertile and contains a moderate amount of organic matter. It generally has excellent tilth and is easy to work and conserve. It is slightly acid and very permeable, well drained, and well aerated. Because the available moisture-holding capacity is high, the moisture content is good throughout much of the drier parts of the year. This soil, however, is likely to be flooded at times, and field operations are often delayed in the spring because of excessive moisture.

Use and suitability (Capability unit I-1).—All of this soil is cultivated. It is used for all the common crops. Probably 50 to 60 percent is used for corn each year.

Because it is level and highly fertile and has good tilth, this soil is well suited to intensive use for row crops. All the common row crops can be grown, but they may be damaged by high water. This risk is particularly great for tobacco and other crops of high value. For hay and pasture, the better legumes and grasses grow well, but alfalfa probably will not last so long as it does on the finer textured red soils of the upland. This soil is especially suitable for pasture because the pasture plants continue to grow during much of the drier part of the grazing season.

Staser silt loam (0 to 2 percent slopes) (Sl).—This soil on bottom lands is deep and well drained. It consists of recent alluvium that was derived mainly from slate and shale. It occurs on almost level flood plains, mostly in areas that are likely to be flooded at times. A significant part of the acreage occurs along Ellejoy Creek and other creeks in shale uplands. Many areas are along the streams in mountain coves. Other areas are scattered throughout the county along streams that have their source in shale or slate uplands or flow through them. This soil is associated with the Hamblen and Prader soils on the bottoms. It is also associated with the Sequatchie and Whitwell soils on the low terraces.

Profile description:

0 to 24 inches, brown or grayish-brown friable granular silt loam.
24 inches +, yellowish-brown or grayish-brown friable silt loam; granular structure; gray mottles below a depth of about 30 inches; depth to bedrock normally more than 5 feet.

In some places a layer that is darker colored than the rest of the profile occurs at depths of 12 to 20 inches. This layer probably is an old surface layer that has been covered by recent deposits. This soil is normally stratified. In places layers that are coarser textured than the other layers occur below depths of 12 to 18 inches. The areas in the mountain coves and along Little River are slightly darker colored than those along the creeks in the shale belts.

This fairly fertile soil contains a moderate amount of organic matter and is slightly acid. It is permeable, well drained, and well aerated. Tilth is good, and the soil is easy to work and to conserve. Because this soil is level and permeable, runoff is slight and the control of erosion is not a problem. The available moisture-holding capacity is high. This soil is likely to be flooded at times, and field operations are frequently delayed in the spring because of excess moisture.

Use and suitability (Capability unit I-1).—All of this soil has been cultivated for many years. It is now used for all the common crops. About 50 to 60 percent of the acreage is in corn. Hay crops and small grains are also grown extensively. Very little or none of the soil is idle.

This is one of the most suitable soils in the county for row crops. Because it is fertile and nearly level, and because it has good tilth and a favorable moisture content, this soil is well suited to intensive use for

crops. All the common row crops grow well, but some may be damaged by high water. This risk is particularly hazardous for tobacco and other crops of high value. High yields of all the grasses and legumes can be obtained.

Stony colluvial land (2 to 25 percent slopes) (Sm).—This land type consists chiefly of colluvium that consists of a large quantity of slate, sandstone, or quartzite fragments mixed with silty or sandy soil material. The colluvium occurs on sloping to moderately steep foot slopes below mountainous areas of Ramsey soils. Much of this land type occurs around the rims of the mountain coves. A few areas are along streams where the material is mainly alluvial.

The soil material is a yellowish-brown silt loam to sandy loam, according to the source of the material. Bedrock occurs at depths of 3 to 12 feet. The largest areas of this land are in Cades Cove. Stone fragments as much as 3 or 4 feet in diameter prevent tillage; the land is of little value for pasture. Capability unit VIIs-1.

Talbott silty clay loam, eroded sloping phase (5 to 12 percent slopes) (Td).—Like the other Talbott soils, this soil has a very firm or plastic subsoil and is moderately shallow to its parent rock of clayey limestone. It is similar to the Dunmore soils, but it is shallower to bedrock and has developed from different parent material. It is somewhat less productive than the Dunmore soils.

Nearly all of this soil is in a large belt that crosses the northwestern corner of the county. It is mainly associated with the Colbert soils and other Talbott soils.

Profile description:

0 to 5 inches, brown or yellowish-brown friable light silty clay loam; moderate medium granular structure.
5 to 9 inches, yellowish-red moderately firm silty clay loam; moderate fine blocky structure.
9 to 24 inches, yellowish-red very firm clay; strong coarse subangular blocky structure.
24 to 42 inches +, yellowish-red very firm clay with some brownish-yellow or yellowish-brown variegations; strong coarse blocky structure.

The depth to bedrock is generally 3 to 5 feet, but between some of the many outcrops it is as much as 8 feet. In most places this moderately eroded soil has had a small amount of the clayey subsoil mixed with the surface soil through tillage. In a few small spots the subsoil is exposed.

Included with this soil are a few areas, about 21 acres, that are not materially eroded. These inclusions have a friable silt loam surface soil about 8 inches thick. Other inclusions that total about 198 acres have 3 to 5 percent slopes. These inclusions occur mainly on the hilltops.

This soil is medium acid to strongly acid. It is low in fertility and organic matter. The plastic subsoil impedes the penetration of roots and the movement of moisture and air, although the roots do penetrate the subsoil slowly. The available moisture-holding capacity is fairly low because much of the absorbed water is tightly held by the clay. Except on the silt loam inclusions that have a surface soil more than 5 inches thick, the tilth is poor. Water is absorbed at a moderate to slow rate, and runoff starts quickly during heavy rains.

Use and suitability (Capability unit IIIe-4).—About 98 percent of this soil has been cultivated; 2 percent is under a cutover forest of hardwoods in which some redcedar is intermixed. About 50 to 60 percent of the acreage is used for pasture, largely unimproved; about 20 percent is used for hay crops and small grains; 15 percent is used for row crops, chiefly corn; and the rest is idle.

All row crops common to the area can be grown. Because of the clayey plastic subsoil and the risk of erosion, however, this soil is not very well suited to vegetables and other row crops. Suitable crops include small grains, alfalfa, red clover, lespedeza, white clover, orchardgrass, and fescue.

Talbott silty clay loam, eroded moderately steep phase (12 to 25 percent slopes) (Te).—This soil of the uplands is well drained. It is moderately shallow over clayey limestone. Because it is steeper than Talbott silty clay loam, eroded sloping phase, it is more severely eroded and shallower to bedrock.

The topsoil is a brown or yellowish-brown silty clay loam. The subsoil is a yellowish-red extremely firm or plastic clay. Limestone bedrock generally occurs at depths of 2 to 4 feet, but in some places it is at the surface and in others its depth is as much as 6 or 7 feet.

This soil is scattered in small areas, mainly in a large belt that crosses the northwestern corner of the county. It is associated with Colbert soils, with other Talbott soils, and with types of Rockland.

This soil is moderately low in fertility and organic matter. It is medium acid to strongly acid. The plow layer is moderately permeable to roots, air, and moisture, and the clayey subsoil is slowly permeable. Water is absorbed very slowly by the clayey subsoil, and runoff starts rapidly during rains. Except in spots where the subsoil material is at or near the surface, workability is fair. Because the clayey subsoil limits the amount of moisture held available to plants, this soil is rather droughty.

Use and suitability (Capability unit IVe-4).—All of this soil has been cultivated. A large part is now in unimproved pasture, and about 20 percent is idle. About 10 percent is used for row crops, chiefly corn.

This soil is probably more suitable for semipermanent hay crops or permanent pasture than it is for row crops. If crops are grown, 5- or 6-year rotations should be used. If used in long rotations, small grains or other close-growing crops are better suited than row crops. Suitable plants include orchardgrass, fescue, red clover, white clover, Ladino clover, sericea lespedeza, and alfalfa.

Talbott silty clay, severely eroded sloping phase (5 to 12 percent slopes) (Tb).—This soil occurs in small tracts that once were areas of Talbott silty clay loam, eroded sloping phase, but these tracts have lost nearly all of their original surface soil and, in places, part of the subsoil. Most of this soil is closely associated with other Talbott soils. Nearly all of the acreage is in the Talbott-Colbert-Lindside soil association.

The plow layer is yellowish-red or reddish-yellow,

firm, plastic silty clay that is underlain by yellowish-red, very firm, plastic clay. Limestone bedrock occurs at depths of 1½ to 5 feet. Some areas have small shallow gullies, most of which can be crossed by heavy machinery.

This soil is low in fertility. It is medium acid to strongly acid. Its clayey material retards infiltration, and runoff develops very quickly during rains. In some places this soil is not easily eroded, but the runoff quickly washes away the loose material on the cultivated parts. Because tilth is very poor and the available moisture-holding capacity is low, this soil is very droughty.

Use and suitability (Capability unit IVe-4).—All of this soil has been cultivated. A small part is cropped, but a very large part is used for unimproved pasture or is idle. Little of the acreage is fertilized.

This soil is poorly suited to crops. If properly fertilized and seeded, it can grow good stands of the better legumes and grasses for pasture. Because of the low available moisture-holding capacity, plants stop growing early in dry periods.

Talbott silty clay, severely eroded moderately steep phase (12 to 25 percent slopes) (Tc).—This reddish plastic soil is moderately shallow to clayey limestone. Most of it occurs in a large belt that crosses the northwestern corner of the county. It is associated with Colbert soils, with other Talbott soils, and with types of Rockland.

Erosion has removed practically all of the original surface layer and, in places, part of the subsoil. The surface soil ranges from yellowish brown to yellowish red and is a firm silty clay. Beneath this layer is yellowish-red extremely firm clay. Shallow gullies are in some areas, and bedrock outcrops in a few places.

This soil is very low in fertility and contains little organic matter. It is medium acid to strongly acid. It has poor tilth and is difficult to work and to conserve. This soil absorbs water slowly and is droughty. The growth of roots is restricted, especially for annuals and other plants that have fast-growing roots.

Use and suitability (Capability unit IVe-4).—All of this soil has been cultivated. Much of it is now idle or is used for unimproved pasture. Many abandoned areas are reverting to forest consisting of cedar and mixed hardwoods. About 10 percent is in permanent pasture.

Because this soil has been severely injured by erosion, it is not suited to tilled crops. It probably is best for permanent pasture. Pasture yields, however, are not high because the soil has a low capacity to hold water that plants can use. Most of the common pasture plants can be grown if this soil is fertilized and grazing is carefully controlled. Fescue, bermudagrass, whiteclover, sericea lespedeza, and annual lespedeza are suitable plants.

Talbott silt loam, moderately steep phase (12 to 25 percent slopes) (Ta).—This inextensive soil of the uplands is well drained. It is moderately shallow to the clayey parent rock. Nearly all of the acreage occurs in a limestone belt that crosses the northwestern part of the county. This soil is associated with Colbert soils and with other Talbott soils. It has formed under a deciduous forest.

The surface layer is brown or yellowish-brown friable silt loam about 8 inches thick. The subsoil is yellowish-red, very firm or plastic clay. Bedrock generally occurs at depths of 3 to 5 feet, but in many places it outcrops, and in some places it occurs at depths as great as 7 feet.

This soil is moderately low in fertility and in organic matter. It is medium acid to strongly acid. The surface soil is moderately permeable, but the subsoil is slowly permeable and has a limited capacity to hold water that plants can use. Because of the slow permeability and strong slopes, runoff starts quickly during rains and erosion is very likely. The clayey subsoil retards the penetration of roots, particularly for summer annuals and other crops that grow for short periods.

Use and suitability (Capability unit IVe-4).—Nearly all of this soil is still under forest. The forest consists mainly of hardwoods, though some redcedar is intermixed. Because of overcutting, the stands are thin.

This soil is probably better suited to permanent hay and pasture crops than it is suited to row crops. If row crops are grown, a 5- or 6-year rotation should be used. Small grains, fescue, orchardgrass, white clover, Ladino clover, red clover, sericea lespedeza, alfalfa, and other grasses and legumes can be grown. If used in long rotations, small grains and other close-growing crops are better suited than corn or other row crops. Corn and sorghum are sometimes grown, but yields are generally low.

Talbott-Colbert very rocky silty clay loams, eroded sloping phases (4 to 12 percent slopes) (Tf).—Enough outcrops of limestone occur in these soils to prevent tillage, but there is enough soil material to grow a fair amount of pasture. The part of the surface covered by outcrops ranges from 10 to 40 percent. To depths of 4 or 5 inches, the soil material between the rocks is brown or yellowish-brown silty clay loam. Like the subsoil of the Talbott or Colbert soils, the subsoil is yellowish-red or reddish-yellow firm silty clay or clay. The soil material in most areas is similar to that of the Talbott soils.

A large part of this mapping unit is associated with Talbott and Colbert soils. The soils occur as scattered areas in a large belt that crosses the northwestern corner of the county. Other areas are scattered throughout the limestone valleys in association with Farragut, Dunmore, Dewey, and Decatur soils.

The soil material is medium acid and about medium in fertility. The tilth is poor, and infiltration of moisture is slow. Because they are clayey and shallow to bedrock, these soils have a low available moisture-holding capacity.

Use and suitability (Capability unit VIIs-1).—About 75 percent of this mapping unit has been cleared. It is used chiefly for permanent pasture. The pasture consists of volunteer plants and some bluegrass and whiteclover. Most areas have many weeds and sprouts.

Although some patches can be cultivated with hand implements, these soils are poorly suited to crops. A fair stand of bluegrass and whiteclover, which can be improved by fertilization, will grow on most areas. Because of the limited available moisture-holding capacity, these soils are droughty during the drier parts of the growing season.

Talbott-Colbert very rocky silty clay loams, eroded moderately steep phases (12 to 30 percent slopes) (Tg).—These soils have many limestone outcrops, and tillage is not feasible. There is, however, enough soil material between the outcrops to grow some plants for permanent pasture.

The part of the surface covered by outcrops ranges from about 12 to 45 percent. In most places the soil between the outcrops is similar to the Talbott soils. In some places it is similar to that of the Colbert soils. The upper 4 or 5 inches is brown or yellowish-brown silty clay loam. The subsoil is a yellowish-red, red, or reddish-yellow extremely firm clay.

Areas of these soils are scattered throughout the limestone uplands of the county. Much of the acreage is in a wide belt that crosses the northwestern corner of the county.

Use and suitability (Capability unit VIIs-1).—About 65 percent has been cleared and is now used chiefly for permanent pasture. The rest is under a cutover forest of hardwoods and redcedar.

Because of the outcrops, these soils are not suitable for cultivated crops. They are best for pasture or forest. Much of the acreage has fair stands of bluegrass and whiteclover that can be improved by fertilization.

Teas loam, steep phase (20 to 45 percent slopes) (Th).—This shallow soil of the uplands is well drained to excessively drained. Its parent rock consists of interbedded shale and fine-grained sandstone. Some of these rocks are purplish red, and these have imparted a purplish color to the overlying soil. The bedrock is dominantly acid but contains calcareous seams.

This soil normally occurs on rounded or domelike hills. All of it occurs in a narrow belt of hills that crosses the center of Millers Cove. Most of it is adjacent to colluvial soils of the surrounding steep mountain slopes.

Profile description:

0 to 5 inches, dark reddish-gray to reddish-gray very friable loam to silt loam; moderate fine granular structure; contains a very few small fragments of sandstone and sandy shale.
5 to 16 inches, dark reddish-brown or reddish-brown friable clay loam; weak fine blocky structure; fragments of sandstone and shale make up about 10 percent of this layer.
16 inches +, reddish-brown or weak-red clay loam soil material mixed with soft fragments of sandstone and shale; fragments make up about 20 percent of layer.

In places the reddish bedrock occurs at a depth of 23 inches. The upper 2 feet of the bedrock is soft and easily broken. Some small inclusions on the narrow ridge crests have slopes of less than 20 percent, but these inclusions are not important separate farming units.

This soil is medium acid to strongly acid. In most places, the surface soil is strongly acid and the subsoil and underlying material are medium acid to slightly acid. The fertility and organic-matter content are low. The phosphorus content is especially low. In most areas this soil contains a fair amount of potassium. Because of the steep slope and shallow depth, runoff is rapid and erosion control is difficult if the soil is not vegetated. The available moisture-supplying capacity is low, and the soil is very droughty. What soil material there is, however, is permeable to roots, air, and moisture.

Use and suitability (Capability unit VIs-1).—About 60 percent of this soil has been cultivated. The rest is under a thin forest, dominantly hardwoods with some pine intermixed. Most of the cleared acreage is used for pasture; some is idle.

Because of the steep slopes and shallow depth, this soil is poorly suited to row crops. Fair pastures can be maintained if enough fertilizer is applied, particularly lime and phosphate. Suitable plants include fescue, ryegrass, whiteclover, and sericea lespedeza.

Tellico loam, eroded sloping phase (5 to 12 percent slopes) (Tn).—This permeable, well-drained soil lies over calcareous sandstone. Most of it is in narrow, irregular strips on the crests of rather high ridges that are above steeper Tellico soils lying on the slopes below. Some of the strips on the ridge crests are fairly wide.

Most of this soil occurs in scattered areas throughout the two major belts of the Tellico-Alcoa-Neubert soil association. One belt crosses the northwestern part of the county just north of Friendsville and Louisville. The other belt extends near and parallel to Chilhowee Mountain along the eastern rim of the Great Valley part of the county.

Profile description:

0 to 5 inches, dark-brown to dark reddish-brown very friable loam; weak fine granular structure.
5 to 8 inches, mixed reddish-brown and dark-red friable clay loam; weak fine subangular blocky structure.
8 to 12 inches, dark-red or red friable clay loam; moderate fine and medium angular blocky structure.
12 to 42 inches +, dark-red or red friable clay loam, sandy clay loam, or sandy clay; moderate medium subangular blocky structure.

The depth to bedrock ranges from 3 to 8 feet. Below 42 inches the material is slightly lighter colored than that above. In many places the bedrock consists of weak-structured or partly disintegrated brown and yellow sandy shale. In these places the soil is lighter colored than that described and is only 2 to 5 feet deep to bedrock. In forested areas the loam surface layer is 7 to 9 inches thick and the upper 2 inches is stained dark with organic matter.

Included with this soil are areas of very fine sandy loam and fine sandy loam. Also included are about 167 acres that have had most of the original surface soil removed by erosion. These inclusions have a surface layer of red or reddish-brown clay loam.

This soil is moderately fertile and contains a moderate amount of organic matter. It is medium acid to strongly acid. It is permeable to roots and moisture and has a fairly high capacity for holding water that

plants can use. The favorable tilth is easy to maintain. Although this soil is susceptible to erosion, it is not difficult to conserve, because the slopes are not strong and rainfall is absorbed rapidly.

Use and suitability (Capability unit IIIe-2).—About 80 percent of this soil is cultivated. The rest is under a badly cutover forest of hardwoods in which some pine is intermixed.

This soil is well suited to row crops, hay, and pasture. It is particularly well suited to vegetables and other crops that need intensive cultivation. A wide variety of field crops can be grown in 3- or 4-year rotations.

Tellico loam, eroded moderately steep phase (12 to 25 percent slopes) (To).—This well-drained soil overlies calcareous sandstone. It occurs on fairly long ridge slopes below Tellico loam, eroded sloping phase, which is on the narrow crests. Most of the acreage is moderately eroded, and small amounts of subsoil material have been mixed with the original surface soil through tillage.

The present surface soil is a dark-brown to reddish-brown very friable loam. The subsoil is a dark-red or dark reddish-brown friable clay loam or sandy clay loam. The sandy bedrock occurs at depths of 2½ to 7 feet.

This soil occurs in many medium-sized areas that are scattered throughout the two major areas of Tellico soils. One area crosses the northwestern corner of the county near Friendsville and Louisville; the other is near and parallel to Chilhowee Mountain in the southern part of the Great Valley part of the county. This soil is associated mainly with other Tellico soils and with Alcoa and Neubert soils.

In many places the bedrock consists of partly disintegrated sandy shale. In these places the soil is shallower to the bedrock than it is in those areas where the soil overlies massive calcareous sandstone. The depth to bedrock is generally greater on the south- and east-facing slopes than it is on the north- and west-facing slopes. In forested areas the loam surface soil is 7 to 9 inches thick and the upper 2 inches is stained dark with organic matter. The bedrock outcrops in a few places.

This soil is moderately fertile. It is medium acid to strongly acid. It is very permeable and has a high capacity to hold water that plants can use. Runoff is moderately rapid, and this soil is highly susceptible to erosion, particularly gully erosion.

Use and suitability (Capability unit IVe-1).—About 84 percent of this soil is used for the general field crops and pasture. The rest is in a cutover hardwood forest.

This soil is suited to row crops, hay, and pasture. If 5- or 6-year rotations are used, all the common crops can be grown. Crops that are planted early in spring are suitable because the soil warms earlier than the silty soils. If properly seeded and fertilized, this soil grows all the common grasses and legumes.

Tellico loam, steep phase (25 to 50 percent slopes) (Tp).—This soil occurs on relatively long slopes in the Tellico-Alcoa-Neubert soil association. Its depth to bedrock is more variable than that of Tellico loam, sloping phase, and generally much shallower. In most places bedrock is 2 to 6 feet below the surface. Outcrops are fairly common, especially on the north-facing slopes. This soil occurs in fairly large individual areas; some areas are 100 to 150 acres in size.

The 4- to 6-inch surface soil is dark-brown to reddish-brown very friable loam. The subsoil is dark-red or dark reddish-brown friable clay loam or sandy clay loam. In some places the bedrock consists of brown, red, and yellow sandy shales. Included with this soil are areas of very fine sandy loam and fine sandy loam.

This soil is moderately fertile and contains a moderate amount of organic matter. It is medium acid to strongly acid. The soil is very permeable to roots and moisture. Because of steep slopes, runoff is rapid.

Use and suitability (Capability unit VIe-1).—All of this soil is under cutover forest, chiefly hardwoods with which some pine is intermixed. This soil is poorly suited to crops and pasture. Most areas should be kept in forest. Areas that must be used for pasture need to be carefully managed because this soil is very likely to erode. The common pasture grasses and legumes can be grown.

Tellico loam, eroded steep phase (25 to 50 percent slopes) (Tr).—This well-drained soil occurs in scattered areas throughout the Tellico-Alcoa-Neubert soil association, normally on the long slopes of fairly high ridges. It is in areas that used to be areas of Tellico loam, steep phase, but these areas have lost part of the surface soil through erosion.

Although classified a loam, this mapping unit includes areas that have a surface soil of clay loam, very fine sandy loam, or fine sandy loam. The surface soil is brown or reddish brown and friable. The subsoil is dark-red or dark reddish-brown friable clay loam or sandy clay loam. Bedrock of calcareous sandstone or shaly sandstone occurs at depths of 2 to 6 feet. There are a few outcrops, mostly on north-facing slopes.

This soil is medium acid to strongly acid. It contains a moderate amount of plant nutrients and organic matter. It is very permeable to roots and moisture throughout its depth. Runoff develops quickly during rains, and the soil is extremely susceptible to erosion, particularly gully erosion.

Use and suitability (Capability unit VIe-1).—All of this soil has been cultivated. A large part is now used for unimproved pasture. About 15 percent is used for crops, chiefly corn and lespedeza. A large acreage is idle.

This soil is not suited to row crops. If it is adequately fertilized and grazing is carefully controlled, fair pastures can be maintained. Unless the need for pastureland is great, it is best to use this soil for forestry.

Tellico loam, very steep phase (50 to 90 percent slopes) (Ts).—This soil occurs in large areas on the steepest parts of the long slopes in the Tellico-Alcoa-Neubert soil association. The 6-inch surface soil is reddish-brown very friable loam. The underlying material is red, friable, sticky clay loam or sandy clay

loam. Bedrock of calcareous sandstone or shaly sandstone is at depths of less than 3 feet, and outcrops are common. Included with this soil are a few rocky bluffs.

This soil is moderately fertile and contains some organic matter. It is strongly acid to medium acid. It is permeable to moisture and roots, but the available moisture-holding capacity is limited by the shallow depth.

Use and suitability (Capability unit VIe-1).—Nearly all of this soil is in cutover deciduous forest. It is poorly suited to crops or pasture. Because this soil is very steep, even the forest is difficult to manage.

Tellico clay loam, severely eroded moderately steep phase (12 to 25 percent slopes) (Tl).—This well-drained soil overlies calcareous sandstone on fairly long slopes. Nearly all of it is in the Tellico-Alcoa-Neubert soil association. Almost all of the original loam surface soil has been removed by erosion, and the surface layer is now largely a red clay loam. This layer is underlain by similar material that, with increasing depth, grades to a lighter red. Bedrock of calcareous sandstone or shaly sandstone occurs at depths of 1½ to 6 feet. Many areas are gullied. Some of the gullies are deep and difficult to fill or stabilize.

This soil is low in fertility and organic matter and is strongly acid. It has poorer tilth than have the less severely eroded Tellico soils, and it absorbs water more slowly. Its available moisture-holding capacity is somewhat limited. Runoff is rapid, and the control of erosion, particularly gully erosion, is difficult.

Use and suitability (Capability unit IVe-3).—All of this soil has been cultivated. About 50 percent is now used for unimproved pasture, parts are idle, and about 20 percent has reverted to forest of Virginia pine. A small acreage is used for corn, small grains, and improved permanent pasture.

This soil is poorly suited to row crops. It is better suited to hay and pasture plants. If properly seeded and fertilized, this soil produces fair yields of the common hay and pasture plants. Row crops can be grown, but the risk of soil losses through erosion is very high.

Tellico clay loam, severely eroded steep phase (25 to 50 percent slopes) (Tm).—This well-drained soil overlies calcareous sandstone or shaly sandstone. It is widely distributed throughout the Tellico-Alcoa-Neubert soil association. It has had its original surface soil removed by erosion, and the surface layer now is red clay loam. The subsoil is dark-red or dark reddish-brown friable clay loam or sandy clay loam. The depth to the sandy bedrock ranges from 1½ to 5 feet, but bedrock outcrops in places. Many areas have gullies, some that are deep and difficult to obliterate. Included with this soil are areas of sandy clay loam.

This soil is low in fertility and organic matter. It is medium acid to strongly acid. It is very permeable to roots and moisture, but runoff is very rapid and the soil is therefore rather droughty. The soil is extremely susceptible to further damage through erosion, particularly gully erosion.

Use and suitability (Capability unit VIe-1).—All of this soil has been cultivated. A notable part has reverted to pine, and most of the rest is used for unimproved pasture or is idle. A very small acreage is used for crops.

This soil is poorly suited to crops or pasture. Its best use probably is for forest. Areas that must be used for pasture need heavy fertilization, some lime, proper seeding, and careful management.

Waynesboro loam, eroded gently sloping phase (2 to 5 percent slopes) (Wa).—This soil of the high stream terraces is well drained. Its parent material is mixed alluvium that was derived from limestone, shale, and sandstone. The plow layer of most of this soil is a mixture of the original surface soil and the subsoil. Most of the acreage is 50 to 150 feet higher than the adjacent flood plains. Some of the largest areas are along the Little River. This soil is associated with Cumberland and Holston soils.

Profile description:

0 to 6 inches, brown very friable loam.
6 to 10 inches, reddish-yellow very friable clay loam.
10 to 40 inches, red or dark-red friable clay loam or silty clay loam.
40 inches +, red moderately friable sandy clay that is somewhat lighter colored than the layer above; some yellowish streaks or splotches.

The depth to limestone or shale bedrock ranges from 4 to 20 feet. A few cobbles occur in some places, but they do not materially interfere with cultivation. In some places the subsoil is more nearly a silty clay than a sandy clay.

Included with this soil is a small, practically uneroded acreage. This inclusion has an 8-inch surface layer of yellowish-brown to brown friable loam. Between depths of 8 and 12 inches the material is reddish-yellow very friable clay loam.

This moderately fertile soil contains a moderate amount of organic matter. It is medium acid to strongly acid. It is permeable to roots and moisture. This soil has moderate internal drainage and a moderately high capacity to hold water that plants can use. The surface layer has good tilth and can be cultivated within a fairly wide range of moisture content.

Use and suitability (Capability unit IIe-2).—Nearly all of the acreage has been cultivated. Most of it is used for corn, small grains, lespedeza grown for hay, and tobacco and other field crops. Some alfalfa is grown. Row crops and small grains are moderately heavily fertilized. Lime has been applied to much of the acreage. Alfalfa and tobacco are rather heavily fertilized.

This soil is well suited to all of the general farm crops, including alfalfa and various truck crops. It responds well to fertilizer and can be used in moderately short rotations, although the more sloping parts are somewhat likely to erode. If suitable pasture legumes and grasses are properly fertilized and managed, a good stand can be maintained.

Waynesboro loam, eroded sloping phase (5 to 12 percent slopes) (Wb).—This well-drained soil of the stream terraces is about 50 to 150 feet above the adjacent flood plains. Much of the acreage is on the high terrace plains of the Little River, where it is associated with Holston and Cumberland soils.

The surface layer—a mixture of the original surface soil and subsoil material—is 5 inches of yellowish-brown to brown heavy loam. The subsoil is red or dark-red friable clay loam that is similar to the subsoil of Waynesboro loam, eroded gently sloping phase.

The depth to bedrock ranges from 3 to 16 feet. In a few places there are enough cobblestones and gravel to interfere with cultivation. Included with this soil are a few practically uneroded areas that have a 6- to 8-inch surface soil of yellowish-brown to brown loam. Also included are patches on the more exposed parts of the slopes where much of the surface layer has been removed. The plow layer of these patches is reddish-yellow or red moderately firm clay loam.

This moderately fertile soil contains some organic matter. It is medium acid to strongly acid. The soil is permeable to moisture and roots and has moderate internal drainage. The available moisture-holding capacity is moderately high.

Use and suitability (Capability unit IIIe-2).—Nearly all of the acreage has been cultivated. Much of it is now used for corn, small grains, lespedeza, alfalfa, tobacco, and other crops. Some of the soil is fertilized and much is limed.

This soil is well suited to general farm crops and certain truck crops, but it is somewhat less suitable for truck crops than are some of the more friable soils. Because of the moderately strong slopes and the risk of erosion, fairly long crop rotations should be used. Crop yields are moderate. If adequately fertilized and otherwise well managed, the more exacting legumes and grasses maintain good stands.

Waynesboro loam, eroded moderately steep phase (12 to 25 percent slopes) (Wc).—Most of this soil occurs on high stream terraces along the Little River. It is more severely eroded than Waynesboro loam, eroded gently sloping phase, and is shallower to bedrock.

The surface layer consists of 5 inches of friable loam or clay loam that is underlain by red or dark-red moderately friable clay loam. The depth to the limestone bedrock ranges from 2 to 8 feet. Cobblestones and gravel occur in a few areas, but they do not materially interfere with cultivation.

Included areas that total 318 acres have lost all their original surface layer through erosion. These inclusions have a plow layer of reddish-yellow or red moderately friable clay loam. Shallow gullies are common in some places, and deep gullies occur in a few areas where the alluvium is several feet thick.

This moderately fertile soil is medium acid to strongly acid. The content of organic matter and the tilth vary according to the degree of erosion. In the more severely eroded areas, tilth and moisture relations are poor.

Use and suitability (Capability unit IVe-1).—Nearly all of this soil has been cultivated. Much of it is now used for pasture, and probably 25 percent is used for crops, chiefly corn and hay. A small part is idle. Some fertilizer is used on the acreage in crops, and some of the acreage is limed.

This soil is suited to crops and pasture. Because of the strong slopes and the risk of erosion, however, long crop rotations should be used, and the soil should be kept in close-growing crops much of the time. Yields are moderate. If adequately fertilized and properly seeded, most of this soil can grow good pasture.

Whitesburg silt loam, gently sloping phase (1 to 5 percent slopes) (Wd).—This soil is moderately well drained to imperfectly drained. It lies in narrow strips along drainways and on fans where sediments have been deposited on the large flood plains. Most areas are flanked by steep Dandridge soils. The parent material is local alluvium that was washed from Dandridge soils. Nearly all of this soil is in the Dandridge-Whitesburg-Hamblen soil association.

Profile description:

0 to 14 inches, dark yellowish-brown moderately friable silt loam.
14 to 22 inches, dark yellowish-brown or yellowish-brown heavy silt loam or silty clay loam, slightly mottled with gray.
22 to 40 inches +, mottled light brownish-gray, brown, and brownish-yellow firm silty clay loam; calcareous shale bedrock occurs at depths of 3 to 7 feet.

This soil is moderately fertile and slightly acid to neutral. It is moderately permeable. It generally has a favorable moisture content and remains moist during most of the growing season. Much water from the adjacent Dandridge slopes seeps to most areas. During periods of heavy rainfall, there is an excess of water.

Use and suitability (Capability unit IIw-1).—Nearly all of this soil is cultivated. The largest acreage is used for corn, and the second largest is used for mixed grass-and-legume hay. Tobacco and garden crops are grown in significant amounts. Many areas that are too small to be farmed as separate units are used in the same way as the rest of the field in which they occur.

This soil is well suited to intensive use. Because of its restricted internal drainage, it is not so well suited to alfalfa. Suitable crops are corn, soybeans, tobacco, most vegetables, orchardgrass, timothy, fescue, red clover, white clover, Ladino clover, crimson clover, lespedeza, and small grains. This soil is well suited for pasture because it remains moist and productive during most of the growing season.

Whitwell loam (0 to 2 percent slopes) (We).—This soil of the low stream terraces is imperfectly drained to moderately well drained. Most of it is nearly level. It occurs along almost all of the large streams of the county. The largest acreage probably is along the Little River. The parent material is mixed alluvium that was washed from the uplands. Sandstone material probably dominates this parent material. The native vegetation was a deciduous forest that contained some water-tolerant trees.

This soil is associated with the Sequatchie soils. It is similar to the Sequatchie soils, but it is imperfectly drained instead of well drained. It is also associated with the Staser, Hamblen, and Prader soils of the first bottoms.

Profile description:

0 to 8 inches, yellowish-brown to brown very friable loam.
8 to 16 inches, yellowish-brown friable loam.
16 to 32 inches, yellowish-brown to brownish-yellow friable clay loam mottled with gray and yellow.
32 to 50 inches, yellowish-brown friable clay loam mottled with yellowish brown, yellow, and gray.

This soil is medium in fertility. It contains a moderate to low amount of organic matter. Because the water table is within 2 or 3 feet of the surface during wet periods, the growth of roots of most plants is restricted. This soil is not well aerated below about 20 inches, but it is permeable. It has good tilth and is easy to work. The available moisture-holding capacity is high.

Use and suitability (Capability unit IIw-1).—All of this soil has been cultivated. The main crops are corn, small grains, lespedeza, red clover, and timothy. Pasture plants are grown mainly in rotation with other crops.

This soil is well suited to corn, and to red clover and many other hay crops. It is not well suited to alfalfa. It is less well suited to tobacco and truck crops than is Sequatchie loam. If fertilizer and crop residues are added, this soil can be used intensively for suitable crops.

Use, Management, and Estimated Yields

Successful farming requires that each kind of soil be used and managed according to its suitability. Many farmers in the county now manage their soils well and thereby obtain yields much higher than the county average. Generally, these farmers are following practices basic to good farming. They do these things:

1. Grow crops on suitable soils and use improved crop varieties.
2. Use a suitable crop rotation that makes the best use of water. Generally, this rotation provides grain, hay, and pasture and has a length and a sequence of crops that conserves and protects the soil.
3. Return barnyard or green manure to the soil to maintain organic matter and nitrogen, and to improve tilth and moisture relations.
4. Apply fertilizer in amounts that meet the needs shown by soil tests.
5. Take reasonable care in preparing seedbeds and follow the Agricultural Experiment Station suggestions for times and rates of seeding.
6. Control weeds, insects, and diseases.

Although these basic practices apply to all of the soils of the county, the 147 mapping units do differ in varying degrees in their suitability for use and the management they require. To present these differences methodically, the soil capability classification system has been used.

Capability Groups

Capability grouping is a system of classification used to show the relative suitability of soils for crops, grazing, forestry, and wildlife. It is a practical grouping based on the needs and limitations of the soils, and the risk of damage to them, and also their response to management. There are three levels above the soil mapping units in this grouping. They are the capability unit, subclass, and class.

The capability unit, which can also be called a management group of soils, is the lowest level of capability grouping. A capability unit is made up of soils similar in kind of management they need, in risk of damage, and in general suitability for use.

The next broader grouping, the subclass, is used to indicate the dominant kind of limitation. The letter symbol "e" indicates that the main limiting factor is risk of erosion if the plant cover is not maintained; "w" means that excess water retards plant growth or interferes with cultivation; "s" shows that the soils are shallow, droughty, or usually low in fertility. In some areas there is another subclass, "c" for the soils that are limited chiefly by a climate that is too cold or too dry. Climate is not considered a limiting factor in Blount County.

The broadest grouping, the land class, is identified by Roman numerals. All the soils in one class have limitations and management problems of about the same degree, but of different kinds, as shown by the subclass. All the land classes except class I may have one or more subclasses.

In classes I, II, and III are soils that are suitable for annual or periodic cultivation of annual or short-lived crops.

Class I soils are those that have the widest range of use and the least risk of damage. They are level, or nearly level, productive, well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care.

Class II soils can be cultivated regularly but do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion. Other soils in class II may be slightly droughty or slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly but have a narrower range of use. These need even more careful management.

In class IV are soils that should be cultivated only occasionally or under very careful management.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops, but they can be used for pasture or range, as woodland, or for wildlife.

Class V soils are nearly level and gently sloping but are droughty, wet, low in fertility, or otherwise unsuitable for cultivation.

Class VI soils are not suitable for crops because they are steep or droughty or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can, without damage, be cultivated enough so that fruit trees or forest trees can be set out or pasture crops seeded.

Class VII soils provide only poor to fair yields of forage or forest products and have characteristics that limit them for these uses.

In class VIII are soils that have practically no agricultural use. Some of them have value as watersheds, wildlife habitats, or for scenery. Blount County has no class VIII soils.

Capability classes, subclasses, and units in Blount County are given in the following outline. The brief description of each unit gives the general nature of the major soils included.

Class I.—Deep, nearly level, productive soils; suitable for tilled crops or other uses; few or no permanent limitations.
- Unit I-1: Deep, well-drained soils on the bottom lands or along narrow lateral drainageways.

Class II.—Soils that have moderate limitations if tilled; suitable for crops, pasture plants, or trees.
- Subclass IIe: Gently sloping soils subject to erosion if cover is not maintained.
  - Unit IIe-1: Deep, permeable, well-drained soils that have a high water-supplying capacity.
  - Unit IIe-2: Deep, permeable, well-drained soils that have a moderately high water-supplying capacity.
  - Unit IIe-3: Deep, well-drained soils that contain much clay and have a moderate water-supplying capacity.
  - Unit IIe-4: Moderately deep, moderately well drained to well drained soils that have a clayey subsoil and a low water-supplying capacity.
- Subclass IIw: Level or nearly level soils that are subject to overflow.
  - Unit IIw-1: Imperfectly drained soils on bottom lands.

Class III.—Soils that have severe limitations and require careful management if used for tilled crops; suitable for crops, pasture plants, and trees.
- Subclass IIIe: Sloping soils subject to erosion.
  - Unit IIIe-1: Deep, permeable, well-drained soils that have a high water-supplying capacity.
  - Unit IIIe-2: Deep, permeable, well-drained soils that have a moderately high water-supplying capacity.
  - Unit IIIe-3: Deep, moderately permeable, well-drained soils that are high in clay and have a moderate water-supplying capacity.
  - Unit IIIe-4: Moderately deep, moderately well drained to well drained clayey soils that have a fairly low water-supplying capacity.
- Subclass IIIs: Sloping soils that are very shallow to bedrock.
  - Unit IIIs-1: Soils that have a very low water-supplying capacity.
- Subclass IIIw: Nearly level to level soils that are subject to overflow.
  - Unit IIIw-1: Poorly drained bottom-land soils.

Class IV.—Soils that are suited to pasture or trees but if tilled are suitable for only limited or occasional cultivation.
- Subclass IVe: Moderately steep soils subject to severe erosion.
  - Unit IVe-1: Deep, well-drained, very permeable soils that have a moderately high water-supplying capacity.
  - Unit IVe-2: Deep, well-drained, moderately permeable soils that are high in clay and have a fairly low water-supplying capacity.
  - Unit IVe-3: Deep, well-drained, permeable soils.
  - Unit IVe-4: Deep, well-drained slowly permeable soils that have a clayey surface layer and a low water-supplying capacity.
- Subclass IVs: Very shallow or sandy droughty soils.
  - Unit IVs-1: Moderately steep soils that are very shallow to shale bedrock.
  - Unit IVs-2: Nearly level or gently sloping very sandy soils that are excessively drained and very droughty.

Class VI.—Soils suited to pasture or trees with moderate limitations; can be cultivated occasionally to prepare pasture seedbed or to plant trees.
- Subclass VIe: Steep soils subject to severe erosion.
  - Unit VIe1: Deep well-drained soils that are generally permeable.
- Subclass VIs: Steep or moderately steep soils that are very shallow or stony.
  - Unit VIs-1: Steep, very shallow soils that are droughty and subject to very severe erosion.
  - Unit VIs2: Moderately steep and sloping soils that are stony or cobbly.

Class VII.—Soils severely limited for pasture plants or trees.
- Subclass VIIs: Soils that are too steep, too stony, or too eroded for cultivation.
  - Unit VIIs-1: Very steep slaty or stony soils, moderately steep and sloping rocky soils, gullied land, and rockland.

Capability Units in Blount County

In this subsection the soils of Blount County are placed in 22 capability units, or management groups, on the basis of similarities in use and management requirements. All the soils in one capability unit need about the same management, but the response to similar management is not exactly the same for all the soils within a unit. Some soils within a unit respond to management better than others. Because of differences in use suitability and management needs, the suggested management for each group of soils differs from that for the other groups, particularly in the management of tilled crops or in the choice of rotations that include row crops.

The suggestions for management of the various groups of soils may not suit exactly the needs of all farmers in the county. Each farm has conditions peculiar to itself. Some of these may call for systems of management that differ from those discussed in this section.

In the discussion that follows, soil characteristics that affect use and management are described for each

TABLE 6.—*Soils of capability unit I-1: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain the yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Barbourville fine sandy loam, gently sloping phase	30	64	13	23	0.7	1.6	2.0	2.7	1,400	1,800	80	128
Barbourville silt loam, gently sloping phase	35	68	14	24	.8	1.7	2.1	2.8	1,450	1,900	85	137
Barbourville silt loam, sloping phase	32	66	14	24	.7	1.6	2.0	2.7	1,450	1,900	80	132
Emory silt loam, level phase	48	78	18	26	1.2	1.8	2.1	2.9	1,700	2,150	130	160
Emory silt loam, gently sloping phase	45	74	18	26	1.2	1.8	2.1	2.9	1,700	2,150	130	160
Emory silty clay loam, gently sloping phase	40	68	17	25	1.1	1.6	2.0	2.8	1,500	2,000	120	150
Greendale silt loam	38	72	15	24	1.1	1.8	2.1	2.9	1,700	2,200	105	155
Neubert loam	42	72	16	24	1.0	1.7	2.0	2.7	1,700	2,200	115	150
Sequatchie silt loam	40	72	14	24	1.1	1.7	2.1	2.9	1,700	2,200	115	150
Sequatchie loam	40	72	14	24	1.1	1.7	2.1	2.8	1,700	2,200	115	150
Sequatchie fine sandy loam	36	63	13	23	1.0	1.5	1.9	2.5	1,550	1,900	100	140
Staser silt loam	47	76	14	22	1.4	1.9	2.1	3.1	1,600	2,200	130	165
Staser loam	45	76	14	22	1.3	1.8	2.0	3.0	1,650	2,250	128	162
Staser fine sandy loam	42	70	13	21	1.1	1.6	1.8	2.7	1,600	2,100	120	150
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	9	21	6	14	0	12	12	27	48	72	6	15
Phosphoric acid (P_2O_5)	18	42	12	26	0	24	24	54	96	132	12	27
Potash (K_2O)	18	42	12	26	0	24	24	54	96	132	12	27

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

capability unit. The soils of the units are listed in tables that give for each soil the average yields of principal crops and permanent pasture that can be expected under two levels of management. In columns A of each table are yields to be expected under the level of management that most farmers maintained at the time of the survey. In columns B are yields to be expected under higher levels of management. This higher level corresponds to the management that the more successful farmers in the county were using at the time of the survey. The practices of this management are equivalent to those suggested for each capability unit.

Capability unit I-1

The soils of capability unit I-1 (table 6) are deep and well drained. They occur on first or second bottoms or along narrow lateral drainways. Practically all of the acreage is nearly level to gently sloping. Most of the bottom land is likely to be flooded at times. Flooding, however, lasts only for very short periods because of the relatively high altitude and the deeply cut stream channels. Although Barbourville silt loam, sloping phase, is placed in this unit, it may need more intensive conservation practices than the other soils in this group.

These soils produce higher yields of general crops than do the soils of any other unit. They are relatively fertile, are high in water-supplying capacity, and are easy to work and to conserve.

Present use and management.—Nearly all the acreage is used for crops. Much of it is used for corn, small grains, and hay. Vegetables are grown on the narrow strips along drainways, chiefly for home use. Tobacco is important, but its acreage is smaller than that of the other crops. Corn is grown continuously on many areas, especially the first bottoms. The acreage of silage appears to be increasing. Important hay crops include red clover, lespedeza, orchardgrass, and timothy. A small acreage of alfalfa is grown.

Use suitability and management needs.—These soils are suited to a wide range of crops and to the common pasture plants. Because of their high value for crops, they are seldom used for pasture.

These soils can be used intensively, but the use of some areas on the bottoms may be limited because of the risk of occasional flooding. High sustained yields of almost all the common crops can be obtained. Suitable crops are corn, soybeans, tobacco, vegetable crops, orchardgrass, timothy, red clover, and lespedeza. Alfalfa is grown, but it seems to be better suited to upland soils. Although row crops can be grown successively, and almost continuously, it is better to grow them in a short rotation. A suitable rotation is corn and hay or corn, a small grain, and red clover. Growing crimson clover and other winter legumes and plow-

TABLE 7.—*Soils of capability unit IIe-1: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Alcoa loam, eroded gently sloping phase	36	62	15	25	1.1	1.8	2.5	3.5	1,600	2,000	90	135
Etowah silt loam, eroded gently sloping phase	35	58	15	24	1.1	1.7	2.5	3.5	1,500	1,950	90	140
Hayter silt loam, gently sloping phase	38	62	15	24	1.1	1.8	2.4	3.4	1,650	2,100	90	135
Hermitage silt loam, gently sloping phase	38	65	15	25	1.2	1.8	2.6	3.5	1,600	2,000	95	140
Hermitage silt loam, eroded gently sloping phase	36	63	14	24	1.1	1.8	2.6	3.5	1,500	1,900	95	140
Minvale silt loam, eroded gently sloping phase	33	60	13	24	1.0	1.7	2.4	3.4	1,500	1,900	90	140
Muse silt loam, eroded gently sloping phase	32	58	12	23	.9	1.6	2.1	3.1	1,450	1,850	85	135
Pace silt loam, gently sloping phase	30	56	12	23	1.0	1.6	1.4	2.2	1,550	1,900	85	132
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	9	21	6	14	0	12	12	27	48	72	6	18
Phosphoric acid (P_2O_5)	18	42	12	26	0	24	24	54	96	144	12	36
Potash (K_2O)	18	42	12	26	0	24	24	54	96	144	12	36

[1] Number of days during grazing season that 1 cow can be grazed on 1 acre without injury to pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

ing them under in the spring should be beneficial, especially where corn is grown several years in succession. On some farms, this practice may be better than using rotations.

Although these soils give fairly high yields without the use of fertilizer, some fertilizer is needed to maintain high yields under intensive use. Partly because of the very high water-supplying capacity, the response to fertilizer is excellent. A good response can be expected to the use of liberal amounts of phosphate and moderate amounts of potash and nitrogen. For maximum growth of red clover and other legumes, small applications of lime are probably needed on most areas. Heavy applications of complete fertilizer can be used profitably for tobacco, vegetables, and other crops of high value.

Special management generally is not needed to maintain good tilth or to control water. The soils can be safely tilled over a wide range of moisture content. Erosion is little or no problem on these soils except in a few places where streambanks are scoured or sandy material is deposited. In some places diversion ditches help to prevent excessive overwash from the adjacent upland slopes.

Capability unit IIe-1

The soils of capability unit IIe-1 (table 7) are deep and generally well drained, but a few areas of Pace silt loam, gently sloping phase, are moderately well drained. These gently sloping soils occur on old alluvial slopes and stream terraces. They have a brown silt loam or brown loam surface soil. Their subsoil ranges from silty clay loam to clay loam.

These soils are permeable to water and have a relatively high water-supplying capacity. Because they are in concave positions or are lower than their surrounding soils, runoff water increases their moisture content. Except for a few areas of Pace silt loam, gently sloping phase, that have restricted air movement, all of these soils are permeable to air and roots.

These soils have good tilth and are easy to work. They are moderately easy to conserve. They range in natural fertility from moderate to moderately high. They are medium acid to strongly acid.

Present use and management.—Nearly all of the acreage of these soils is used for crops. The common crops of the county are grown. In many places irregular crop rotations are used; in a few places the rotations are systematic. Corn and hay are the most extensive crops, but a small acreage of tobacco is grown. Yields of all crops generally are high.

Use suitability and management needs.—These soils are suitable for moderately intensive use. Except for a few areas of Pace silt loam, gently sloping phase, that cannot produce high yields of alfalfa, these soils are very well suited to the crops commonly grown in the area. They are well suited to tobacco, vegetables, and other crops of high value per acre. If adequately fertilized, these soils give high yields of all common crops. They are suited to the common pasture plants and can produce excellent permanent pasture and winter pasture.

If these soils are well managed, the risk of erosion is slight. The soils can be conserved by the use of 2-year rotations in which annual grasses and legumes are grown half of the time. Longer rotations, however,

TABLE 8.—*Soils of capability unit IIe-2: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Christian loam, eroded gently sloping phase	25	52	11	20	0.7	1.4	2.1	2.9	1,200	1,750	55	115
Jefferson fine sandy loam, gently sloping phase	26	58	12	22	.8	1.6	2.1	2.8	1,450	2,100	65	125
Waynesboro loam, eroded gently sloping phase	35	58	14	23	.9	1.7	2.5	3.5	1,400	1,800	85	130
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	6	18	0	12	0	9	12	27	48	72	6	18
Phosphoric acid (P_2O_5)	12	36	0	24	0	18	24	54	96	132	12	36
Potash (K_2O)	12	36	0	24	0	18	24	54	96	132	12	36

[1] Number of days during grazing season that 1 cow can be grazed on 1 acre without injury to pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

may be better on some farms. The turning under of green-manure crops and crop residues helps to maintain organic matter and fertility and to improve tilth. If these soils are cultivated on the contour and the natural waterways are kept in sod, runoff channels will not form so readily and more water will enter the soil.

Capability unit IIe-2

The soils of capability unit IIe-2 (table 8) are deep and well drained. These gently sloping soils occur in uplands, on high stream terraces, and on old colluvial slopes. They have a light-brown to brown loam surface soil and a friable clay loam or silty clay loam subsoil.

These soils are friable and permeable. Although their water-supplying capacity is relatively high, it is somewhat less than that of the soils of capability unit IIe-1. All of the soils have good tilth, are easy to work, and are moderately easy to conserve. Their natural fertility ranges from low to moderate, and they are medium acid to strongly acid.

Present use and management.—Nearly all of the acreage of these soils is cultivated. A number of small patches are still under natural forest, and a small part is idle. Corn, small grains, and hay are the chief crops. About half of the small grains is oats and the rest is wheat. About 20 percent of the acreage is used for pasture, chiefly rotation pasture. Tobacco is the most important cash crop, but its acreage is small.

Corn and small grains usually receive light to moderate applications of a complete fertilizer. Tobacco is fertilized heavily with complete fertilizers and barnyard manure. Most pastures are not managed at a high level; a large part of the pasture land is unimproved. Most areas have been limed, but little lime has been used in the last 10 years.

Use suitability and management needs.—These soils are physically well suited to all the crops and pasture plants commonly grown in the area. They need, however, additions of calcium, phosphate, potash, and organic matter. If they are adequately fertilized, yields are moderately high to high. The Jefferson and Christian soils, particularly, need amendments. All these soils respond well to fertilization.

These soils can be used for 2-year rotations, but longer rotations may be better on many farms. A suitable rotation is corn or another row crop, a small grain, and then 1 or 2 years of legume-and-grass hay. If the corn is harvested early, the small grain can be omitted from the foregoing rotation. If these soils are used for crops in short rotations, barnyard manure, green-manure crops, and crop residues should be turned under as often as possible. To conserve water and reduce erosion, these soils should be cultivated on the contour and the natural waterways should be kept in sod. They can be tilled within a fairly wide range of moisture content.

If these soils are adequately fertilized and limed, they can maintain good stands of whiteclover, orchardgrass, and other pasture plants. The quality of the pasture can be improved by mowing at intervals to remove weeds and excess pasture herbage. If fertility is raised, these soils are well suited to winter pasture, because good seedbeds can be prepared and grazing need not be delayed because of excess moisture so long as it is on finer textured soils.

Capability unit IIe-3

The soils of capability unit IIe-3 (table 9) are deep, gently sloping, and well drained. These occur on uplands and on high stream terraces. They have a brown silty clay loam surface soil and a red to dark-red firm clayey subsoil.

TABLE 9.—*Soils of capability unit IIe-3: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Cumberland silty clay loam, eroded gently sloping phase	37	58	17	26	1.1	1.7	2.9	3.7	1,400	1,800	95	140
Decatur silty clay loam, eroded gently sloping phase	36	56	16	25	1.1	1.7	2.9	3.7	1,350	1,750	90	130
Dewey silty clay loam, eroded gently sloping phase	34	55	14	24	1.0	1.6	2.8	3.6	1,350	1,700	85	135
Dunmore silty clay loam, eroded gently sloping phase	28	52	13	23	.9	1.5	2.6	3.5	1,300	1,650	70	125
Farragut silty clay loam, eroded gently sloping phase	32	52	14	24	1.0	1.5	2.7	3.5	1,300	1,600	80	125
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	12	24	6	12	0	12	15	27	48	72	6	18
Phosphoric acid (P_2O_5)	24	48	12	24	0	24	30	52	96	132	12	36
Potash (K_2O)	24	48	12	24	0	24	30	52	96	132	12	36

[1] Number of days during grazing season that 1 cow can be grazed on 1 acre without injury to pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

These soils are moderate in water-supplying capacity. They absorb and hold large quantities of water, but because of the high content of clay, a large part of the water is held tightly around the clay particles and is not available to plants. The moisture supply therefore is limited during dry periods. These soils cannot supply so much water to plants as can the soils of groups IIe-1 and IIe-2. They are relatively high in natural fertility and medium acid to strongly acid. They respond well to fertilizer.

Present use and management.—Practically all of the acreage of these soils has been cultivated. Only a few small scattered patches remain under forest. Very little is idle. Corn, small grains, and legume-and-grass hay are extensively grown. Some of the acreage is used for pasture, mainly rotation pasture. Tobacco is the most important cash crop, even though its total acreage is small. These soils are farmed rather intensively.

Complete fertilizers are commonly applied to all row crops. Most of the acreage has been limed. Fertilization, particular on the Cumberland, Dewey, and Decatur soils, is probably more common and more extensive on the soils of this capability unit than on those of any other unit in the county. The high natural fertility has been fairly well maintained by the use of commercial fertilizers. On some soils it has been increased. Of the group, the Dunmore soils have received the least fertilizer. The high fertility of the soils of this unit tends to offset the moderate water-supplying capacity.

Use suitability and management needs.—These soils are suited to the commonly grown crops and pasture plants. They are considered among the best soils of the county for alfalfa and other legumes and grasses that are grown for hay or pasture. They are probably better suited to grasses and legumes than they are suited to row crops, but good yields of row crops can be obtained. These soils are well suited to winter pasture, but it may be more difficult to establish a good stand on these soils than it is on some of the more friable coarser soils. Furthermore, these soils have longer periods when they are too wet to be grazed.

Because runoff develops more quickly on these soils than on the soils of units IIe-1 and IIe-2, management to control water is more exacting. This management included the use of suitable rotations, cultivation on the contour, and leaving natural waterways in sod. These soils can be conserved by the use of a 2- or 3-year rotation, preferably a 3-year rotation in which close-growing crops are used at least half of the time. A suitable rotation is corn, a small grain, and then grass and clover for 1 or 2 years. These soils should have cover to protect them in winter when rainfall is high.

Lime and phosphate are the most needed elements for most crops. Many crops respond well to potash. If legumes are grown, they supply a part of the needed nitrogen. Good tilth is not particularly difficult to maintain. These soils need more care in seedbed preparation and other cultivation than do more friable soils. They cannot be cultivated over so wide a range of moisture content as can the more friable soils of groups IIe-1 and IIe-2. Because they contain much

TABLE 10.—*Soils of capability unit IIe-4: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in Columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table. Dashed lines indicate either crop is not grown under management specified or soil is unsuited to its production]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Leadvale silt loam, gently sloping phase	26	46	12	20	0.8	1.5			1,400	1,850	65	120
Leadvale silt loam, eroded gently sloping phase	24	44	12	20	.7	1.4			1,350	1,700	60	115
Sequoia silty clay loam, eroded gently sloping phase	25	45	13	23	.8	1.5	2.3	3.0	1,300	1,700	70	110
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	6	18	0	12	6	9	12	27	48	72	9	18
Phosphoric acid (P_2O_5)	12	36	0	24	12	18	24	54	96	132	18	36
Potash (K_2O)	12	36	0	24	12	18	24	54	96	132	18	36

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

clay, they puddle or clod if they are cultivated when too wet. When these soils are dry, cultivation is especially difficult on the more eroded parts where the clayey subsoil is near the surface.

Capability unit IIe-4

The soils of capability unit IIe-4 (table 10) consist of moderately well drained Leadvale soils that occur on colluvial foot slopes and of the well-drained Sequoia soil that is on uplands. These gently sloping soils were developed from shaly materials. The depth to bedrock ranges from 2½ to 4 feet, the Leadvale soils being slightly deeper than the Sequoia soil.

These soils have a friable silt loam or silty clay loam surface soil. Their subsoil is firm silty clay to clay. They have a moderate water-supplying capacity and are moderate to low in fertility. Their reaction is medium acid to strongly acid.

Present use and management.—Nearly all of the acreage is cultivated. A few small areas are in native hardwoods and pines. The cultivated acreage is used mainly for corn, small grains, hay, and pasture. Lespedeza is the most extensive hay crop, and the small grains are chiefly oats and wheat. Much of the pasture is unimproved. Tobacco is the most important cash crop, but its acreage is small. Except on soils used for tobacco, fertilization has been light. Much of the acreage, however, has been limed. Pastures are not commonly fertilized. Yields on these soils are low.

Use suitability and management needs.—These soils are suited to corn, small grains, tobacco, truck crops, Ladino clover, white clover, red clover, orchardgrass, timothy, fescue, and lespedeza. Because of the restricted internal drainage, the Leadvale soils are not suited to alfalfa. Alfalfa can be grown on the Sequoia soil. All the pasture plants of the area can be grown on the soils of this capability unit. The slowly drained parts of the Leadvale soils are not very well suited to winter pasture crops, because they are colder and more slowly drained than some of the upland soils.

If runoff is controlled, winter cover crops are grown, cultivation is on the contour, and crops are properly selected, these soils can be used in a 2-year rotation. On most farms, however, a 3-year rotation is preferred. A suitable rotation is a row crop, a small grain, and then a grass-and-legume mixture. A 3-year rotation of corn, a small grain, and red clover is also well suited. Crop residues and green-manure crops should be turned under to improve tilth and to supply organic matter. These soils cannot be safely tilled over so wide a range of moisture as can the soils of capability units IIe-1 and IIe-2 and other more friable soils.

Capability unit IIw-1

The soils of capability unit IIw-1 (table 11) are deep and generally imperfectly drained. They occur on first or second bottoms or as narrow strips along lateral drainways. They are level or nearly level; some areas are slightly depressed. A large part of the acreage is likely to be flooded at times. Although flooding is a hazard, the floodwaters deposit sediments that help maintain fertility. The Whitesburg soil and the local alluvium phase of the Hamblen soils are not ordinarily subject to flooding, but they are likely to be washed by water from the adjacent upland slopes. Although this overwash may be a hazard to crops, it replenishes plant nutrients by adding fresh sediments. Almost all of the bottom land has a water table that may be near the surface during periods of high rainfall. The upper 15

TABLE 11.—*Soils of capability unit IIw-1: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table. Dashed lines indicate either crop is not grown under management specified or soil is unsuited to its production]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:										
Hamblen silt loam	42	68	13	21	1.5	1.9	.....	.....	120	160
Hamblen silt loam, local alluvium phase	40	68	13	21	1.4	1.9	.....	.....	120	160
Hamblen loam	43	68	14	21	1.4	1.9	.....	.....	120	155
Lindside silt loam	43	70	13	21	1.6	2.0	.....	.....	125	165
Whitesburg silt loam, gently sloping phase	38	65	13	20	1.3	1.9	1,500	2,100	115	155
Whitwell loam	32	62	12	22	1.0	1.6	.....	.....	105	145
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]										
Nitrogen (N)	9	21	6	14	0	9	48	72	6	15
Phosphoric acid (P_2O_5)	18	42	12	26	0	18	96	132	12	30
Potash (K_2O)	18	42	12	26	0	18	96	132	12	30

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years.

to 18 inches of these soils is friable and well aerated, but below 18 inches the material is mottled and not well aerated. These soils have a high water-supplying capacity.

Present use and management.—Almost all the acreage of this unit is used for crops. The chief crops are corn and hay. Lespedeza is the most extensive hay crop, but red clover, timothy, and orchardgrass are also grown for hay. Many areas are used continuously for row crops, chiefly corn. Soybeans are grown in a few places. Tobacco is an important crop on the Whitesburg soil. These soils generally are not artificially drained, but in a few places stream channels have been straightened so that runoff is removed more rapidly. Fertilization varies widely from place to place, but most farmers apply moderate amounts of a complete fertilizer to row crops. Pastures are not commonly fertilized.

Use suitability and management needs.—Although their total acreage is small, the soils of this unit are very important because they are fertile and easy to cultivate and to conserve. The retarded internal drainage, however, limits the use suitability of these soils. Crops that need more rapid internal drainage are not well suited.

High yields of corn, soybeans, sorghum, small grains, red clover, white clover, orchardgrass, timothy, and lespedeza can be obtained. Alfalfa generally is not suited to the soils of this group. Tobacco is suited to the better drained parts of the Whitesburg and other soils, but it does not grow well in places where seepage is excessive. Small grains generally grow well, but they commonly tend to lodge and mature later than they do on better drained upland soils.

These soils are especially well suited to pasture. A good stand of grasses and legumes of high quality can be grown. Pasture plants continue to grow on these soils during dry periods when those on upland soils have ceased to grow. These soils are especially valuable for supplemental summer pastures. Nearly all of the common pasture plants can be grown.

The selection of suitable crops is especially important. Suitable crops can be grown almost continuously, but probably they should be grown in a short rotation. A rotation of corn and hay is especially well suited. Where row crops are grown intensively, the organic matter and tilth can be maintained by turning under winter legumes in the spring.

Although fairly good yields are obtained without the use of amendments, some fertilizer is needed to maintain high yields under intensive use. Nearly all crops respond well to liberal applications of phosphate. As a group, the soils are fairly well supplied with lime, but small amounts may be needed on some areas. Soil tests should be made before lime is applied. Moderate applications of potash are generally needed for most crops, the amount depending upon the crop grown and the past cropping system. Under continuous cropping, nitrogen fertilizer should be added, even though the legumes in a crop rotation supply some nitrogen.

These soils do not need special tillage, and they can be tilled over a fairly wide range of moisture content. Field operations, however, are often delayed in the spring because of excess moisture. In some places ditches are useful to divert overwash and runoff water from adjacent upland slopes. The range of use suitability and productivity of these soils can be increased in many places by artificial drainage. The advisability of drainage, however, depends on cost, feasibility of drainage from an engineering standpoint, the amount

TABLE 12.—*Soils of capability unit IIIe-1: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Alcoa loam, eroded sloping phase	32	56	14	23	1.0	1.6	2.2	3.1	1,450	1,800	80	125
Etowah silt loam, eroded sloping phase	33	52	14	22	1.0	1.6	2.3	3.2	1,350	1,850	80	125
Hayter silt loam, sloping phase	35	56	14	22	1.0	1.6	2.1	3.1	1,500	1,900	80	125
Hermitage silt loam, eroded sloping phase	32	56	14	24	1.0	1.7	2.6	3.4	1,350	1,775	85	130
Minvale silt loam, eroded sloping phase	30	54	12	22	.9	1.5	2.2	3.0	1,350	1,775	75	125
Muse silt loam, eroded sloping phase	29	52	11	21	.8	1.5	1.9	2.8	1,300	1,700	75	122
Pace silt loam, eroded sloping phase	28	52	11	21	.8	1.4	1.2	1.9	1,450	1,800	74	117
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	9	21	6	12	0	12	12	27	48	72	6	18
Phosphoric acid (P_2O_5)	18	42	12	24	0	24	24	54	96	132	12	36
Potash (K_2O)	18	42	12	24	0	24	24	54	96	132	12	36

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

of suitable soils on the farm, and many other factors. Because artificial drainage would make these soils suitable for only a few additional crops, probably drainage is not advisable on many farms.

Capability unit IIIe-1

The soils of capability unit IIIe-1 (table 12) are deep to bedrock and generally well drained. They occur on 5 to 12 percent slopes on old stream terraces or old colluvium. They have a light-brown to dark-brown friable loam or silt loam surface soil. Their subsoil is yellowish-brown to yellowish-red friable silty clay loam or clay loam.

These soils are friable and permeable throughout their depth. Except for some areas of the Pace soil, they are well drained. They absorb water readily and have a fairly high water-supplying capacity. Fertility ranges from low to high, and the reaction is generally medium acid to strongly acid. These soils have good tilth, are easy to work, and are fairly easy to conserve.

Present use and management.—Nearly all the acreage is cultivated. Only a few scattered small patches are under the native hardwood forest. All of the common crops are grown, mainly corn, hay, small grains, and pasture. Tobacco is important, but its total acreage is small. Many small areas are used for garden crops. Lespedeza, alfalfa, timothy, and red clover are the more common hay crops.

Much of the acreage is used for crops grown in moderately short rotations, but tobacco is grown on the same plot year after year. These soils are farmed rather intensively, and very little of their acreage is idle. Fertilizer is applied in moderate amounts to most row crops and small grain. Heavy applications of complete fertilizers and manure are used for tobacco. Much of the acreage has been limed.

Use suitability and management needs.—These soils can be used for a fairly wide range of crops and pasture plants. They are well suited to crimson clover, oats, and other plants grown for winter pasture. Some imperfectly drained areas of the Pace soils, however, are not well suited to alfalfa. Pasture on these soils can be grazed for longer periods than can those on the finer textured clayey soils. These soils give high yields of tobacco, vegetables, and other valuable crops.

Because they are sloping, these soils are somewhat more susceptible to erosion than the soils of unit IIe-1, and they need longer rotations that include more close-growing crops. A rotation of corn or another row crop, a small grain, and about 2 years of mixed legumes and grasses grown for hay or pasture is well suited. Any of the common row crops, small grains, grasses, and legumes can be used in this rotation.

These soils respond well to the addition of nitrogen, phosphate, potash, and lime. A fairly high state of fertility is not difficult to maintain. Liberal applications of complete fertilizer and lime are generally needed to establish pasture of high quality. Pasture plants particularly need lime and phosphate.

These soils can be cultivated over a fairly wide range of moisture content. Because of the slope and the moderate risk of erosion, water should be controlled by cultivating on the contour and leaving the natural drainways in sod. Stripcropping may be needed on some of the longer slopes, but in most places water can be controlled by keeping the soil in close-growing plants much of the time.

TABLE 13.—*Soils of capability unit IIIe-2: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Allen fine sandy loam, eroded sloping phase	23	50	11	20	0.7	1.5	1.9	2.5	1,350	1,850	65	115
Allen silt loam, eroded sloping phase	24	54	11	21	.8	1.6	2.0	2.6	1,350	1,800	65	120
Christian loam, eroded sloping phase	22	48	11	19	.6	1.3	1.9	2.6	1,150	1,650	55	110
Holston fine sandy loam, eroded sloping phase	24	48	10	20	.6	1.4	1.9	2.4	1,350	1,850	55	115
Jefferson fine sandy loam, eroded sloping phase	24	52	10	19	.7	1.5	1.9	2.4	1,350	1,800	60	115
Tellico loam, eroded sloping phase	27	50	13	22	.8	1.5	2.2	2.9	1,300	1,650	75	125
Waynesboro loam, eroded sloping phase	32	53	13	22	.8	1.5	2.3	3.0	1,250	1,650	75	125
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	6	21	0	12	0	9	12	27	48	72	6	15
Phosphoric acid (P_2O_5)	12	42	0	24	0	18	24	54	96	132	12	30
Potash (K_2O)	12	42	0	24	0	18	24	54	96	132	12	30

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

Capability unit IIIe-2

The soils of capability unit IIIe-2 (table 13) are deep and well drained. They have developed from sandy materials on 5 to 12 percent slopes. Most of the acreage is 3 feet or more to bedrock of sandstone, shale, or limestone. These soils have a very friable silt loam, loam, or fine sandy loam surface soil. Their subsoil is friable permeable clay loam.

These soils absorb water rapidly and have a moderately high water-supplying capacity. They are generally strongly acid. Their natural fertility ranges from low in the Holston and Jefferson soils to moderately high in the Tellico and Waynesboro soils. They have good tilth, are easy to work, and are fairly easy to conserve.

Present use and management.—A very large part of the acreage has been cultivated. About 10 percent remains under a cutover mixed hardwood and pine forest. About 25 percent is now used for pasture, and most of the rest is in crops. A small acreage is idle. Most of the pasture is unimproved. These soils have been only lightly fertilized, but lime has been applied to much of the acreage.

Use suitability and management needs.—These soils can be used for a wide range of crops and pasture plants. They are particularly suitable for tobacco, vegetables, and similar crops. Because they are naturally infertile, yields of alfalfa are commonly low. If fertility is kept high, however, these soils produce good pasture and high yields of all crops. They are well suited to winter pasture plants. They are better suited to withstand trampling in winter when they are moist than are the finer textured soils.

Because they are sloping and moderately susceptible to erosion, these soils are not suitable for intensive use. Rotations lasting 3 or 4 years that keep close-growing vegetation on the land most of the time are well suited. A suitable rotation is a row crop, a small grain, and then a grass-and-legume mixture grown for about 2 years. Because they are permeable, these soils are not so erosive as are the finer textured clayey soils. Some soil losses, however, will occur unless runoff is controlled. Cultivating on the contour and leaving the natural waterways in sod will help to restrain runoff and conserve soil and moisture. If some of the longer slopes are needed to grow grain, these crops should be cultivated in strips and rotated. These soils are practically stone free and are easy to farm with machinery.

Capability unit IIIe-3

The soils of capability unit IIIe-3 (table 14) are deep and well drained. These sloping soils have developed from high-grade, fine-textured limestone materials. They have a silty clay loam to silt loam surface soil and a red to dark-red firm or plastic clayey subsoil.

These soils absorb water readily, but a large part of this water is held tightly by the clay and is not available to plants. Because of the high content of clay, these soils shrink and crack in summer during dry periods. As a group, they are the most fertile upland soils in the county. The Dunmore soils are lower in natural fertility than are the other members of this unit. All are about medium acid.

Present use and management.—Nearly all of the acreage has been cultivated. About 5 percent remains in native upland hardwoods. Corn, hay, and small

TABLE 14.—*Soils of capability unit IIIe-3: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Cumberland silty clay loam, eroded sloping phase	32	50	15	25	1.0	1.6	2.6	3.4	1,300	1,650	80	130
Decatur silty clay loam, eroded sloping phase	32	48	15	25	1.0	1.6	2.7	3.4	1,250	1,600	80	125
Dewey silt loam, sloping phase	32	48	15	24	1.0	1.6	2.7	3.4	1,250	1,600	80	125
Dewey silty clay loam, eroded sloping phase	30	46	14	24	1.0	1.6	2.6	3.4	1,200	1,550	75	125
Dunmore silt loam, sloping phase	26	46	13	23	.9	1.5	2.6	3.5	1,250	1,550	70	125
Dunmore silty clay loam, eroded sloping phase	25	44	12	21	.8	1.4	2.4	3.3	1,200	1,500	70	122
Farragut silty clay loam, eroded sloping phase	25	46	13	23	1.0	1.5	2.5	3.2	1,175	1,500	75	120
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	12	24	6	12	0	12	15	27	48	72	6	18
Phosphoric acid (P_2O_5)	24	48	12	24	0	24	30	52	96	132	12	36
Potash (K_2O)	24	48	12	24	0	24	30	52	96	132	12	36

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

grains are the most extensive crops. Tobacco is an important cash crop. Probably 25 percent of the acreage is used for pasture, which is grown mainly in rotation with crops. A small acreage is used for permanent pasture. Many small areas are used for permanent pasture along with adjacent steep areas. Some of the best pastures in the county are on the soils of this unit.

These soils have been fertilized heavier than have the soils of most other units, and much of the acreage has been limed. The row crops and small grains are fertilized at moderate rates. Many of the pastures have also been fertilized. As a whole, yields are relatively high, particularly for hay crops, small grains, and pasture.

Use suitability and management needs.—These soils are well suited to almost all crops commonly grown. They are particularly well suited to small grains, hay, and pasture. Some of the soils of this unit are the best in the county for alfalfa. Although fairly well suited to row crops, these soils are somewhat better suited to close-growing crops. They are well suited to orchardgrass, bluegrass, whiteclover, and lespedeza. Moisture is normally adequate to produce pasture of good carrying capacity through much of the grazing season. These soils are not well suited to row crops that mature in late summer or early in fall when the moisture supply is low.

Because of the slopes and risk of erosion, row crops should not be grown on these soils more than once every 3 or 4 years. Because the permeability of the subsoil is slower than that of the soils of units IIIe-1 and IIIe-2, runoff is a greater hazard and more exacting management is needed. A suitable rotation is corn, a small grain, and then grasses and legumes grown for hay or pasture for 2 or 3 years. On some farms a small grain followed by a grass-and-legume meadow might be a more suitable rotation.

Tobacco and vegetables can be grown, but they are not so well suited to these soils as they are to the more friable soils of units IIIe-1 and IIIe-2. If row crops are grown, runoff should be controlled by cultivating on the contour and leaving natural waterways in sod. Stripcropping may be needed on some of the longer slopes.

These soils do not need so much fertilizer as many of the other soils of the county, but they respond well to it. They particularly need additions of organic matter, phosphate, and lime.

Because of the high clay content, these soils cannot be tilled over so wide a range of moisture content as can the soils of units IIIe-1 and IIIe-2. They clod or puddle if the soils are cultivated when they are wet, and they become rather hard when dry. Crop residues and green-manure crops should be turned under to improve tilth.

Capability unit IIIe-4

The soils of capability unit IIIe-4 (table 15) are well drained or moderately well drained. These sloping soils have developed from shale materials. The well-drained Talbott and Sequoia soils occur on uplands; the moderately well drained Leadvale soil occurs on old colluvial slopes.

These soils have a moderately friable silty clay loam to silt loam surface soil and a very firm or plastic sub-

TABLE 15.—*Soils of capability unit IIIe-4: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table. Dashed lines indicate either crop is not grown under management specified or soil is unsuited to its production]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Leadvale silt loam, eroded sloping phase	23	43	11	18	0.7	1.5	.....	.....	1,250	1,700	55	110
Sequoia silty clay loam, eroded sloping phase	22	40	11	19	.7	1.4	2.1	2.6	1,050	1,350	60	105
Talbott silty clay loam, eroded sloping phase	22	38	11	18	.7	1.4	2.1	2.6	850	1,250	55	100
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	6	18	0	12	6	12	12	27	48	72	9	18
Phosphoric acid (P_2O_5)	12	36	0	24	12	24	24	54	96	132	15	36
Potash (K_2O)	12	36	0	24	12	24	24	54	96	132	15	36

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

soil. They contain a large amount of clay in their subsoils. The depth to bedrock of shale or limestone generally ranges from 2 to 4 feet, but outcrops are common on the Talbott soils.

Because they are clayey, these soils have a rather low capacity to hold water available to plants. The Talbott soils are particularly droughty. Some of the Leadvale areas receive some runoff water from higher lying areas and tend to be slightly less droughty than do the other soils of this unit. These soils are very low in natural fertility and are strongly acid. They contain a small amount of organic matter. They differ from the soils of unit IIe-4 chiefly in occupying stronger slopes.

Present use and management.—Nearly all the acreage has been cultivated. Probably 5 to 10 percent remains under hardwood forest that is scattered in many small patches or woodlots. About 25 percent of the acreage is now used as pasture, and a significant acreage is idle. Part of the pasture has been improved by seeding and fertilization, but the rest is relatively unimproved. Corn, hay, and small grains are the most extensive crops. A small acreage is in tobacco, truck crops, and alfalfa. Except on areas in tobacco and vegetables, fertilization has been light. Part of the acreage has been limed. Crops generally are not grown in systematic rotations.

Use suitability and management needs.—These soils are not well suited to truck crops, especially root crops. The more eroded areas are not well suited to tobacco. Corn is grown, but yields are rather low. These soils are better suited to early maturing crops than they are to those that mature late in summer or early in fall. They are suited to small grains and nearly all hay and pasture plants. If the soils are well fertilized, they produce good permanent pasture of legumes and grasses, but the plants cease to grow during the dry seasons. Alfalfa does not grow well or last long on the Leadvale soil.

Row crops should be grown only infrequently. Most cultivated areas need a 4-year rotation in which close-growing crops or sod are used three-fourths of the time. A suitable rotation consists of a row crop, a small grain, and then 2 or 3 years of mixed grasses and legumes grown for hay or pasture. In some areas a rotation of small grain and grasses and legumes may be more suitable.

Substantial amounts of complete fertilizers and lime must be applied if satisfactory yields are to be obtained. Because of the somewhat unfavorable moisture content or low water-supplying capacity, response to fertilization is not so great as it is on the more friable and permeable soils.

Because the plow layer is clayey, especially in the more eroded parts, tilth is difficult to maintain. These soils can be tilled only within a narrow range of moisture content. The plow layer tends to clod or puddle if cultivated when too wet, and it tends to be very hard when dry.

Because of the rapid runoff and erosion hazard, these soils must be protected. It is particularly important to preserve the remaining surface soil because the properties of the subsoil are poor. Cultivation should always be on the contour, and an effective cover of vegetation should be kept in all natural waterways. Strip-cropping is needed on some of the longer slopes. Terracing, however, may not be practical, because the depth to bedrock is shallow and the subsoil is clayey.

Capability unit IIIs-1

The soils of capability unit IIIs-1 (table 16) are shallow to shale or limestone bedrock. They are gently

TABLE 16.—*Soils of capability unit IIIs-1: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table. Dashed lines indicate either crop is not grown under management specified or soil is unsuited to its production]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Bland silt loam, sloping phase	15	27	9	16	0.6	1.0	.....	.....	.....	.....	55	85
Colbert silty clay loam, eroded sloping phase	15	25	7	12	.5	.8	.....	.....	.....	.....	55	80
Dandridge silt loam, sloping phase	24	35	11	20	.8	1.4	1.9	2.4	1,100	1,350	65	95
Litz silt loam, gently sloping phase	23	40	10	20	.8	1.4	1.7	2.2	.....	.....	50	95
Litz silt loam, sloping phase	22	38	9	19	.7	1.3	1.7	2.2	.....	.....	45	90
Litz shaly silty clay loam, eroded sloping phase	18	33	8	17	.6	1.1	1.5	2.0	.....	.....	40	85
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	6	15	0	12	0	9	12	18	48	72	6	15
Phosphoric acid (P_2O_5)	12	30	0	24	0	18	24	36	96	144	12	30
Potash (K_2O)	12	30	0	24	0	18	24	36	96	144	12	30

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rates are for seeding; annual applications of phosphate and potash may be needed for maintenance.

sloping to sloping and well drained. Their fertility is moderate to low. They contain a small amount of organic matter. Most of the soils are medium acid or strongly acid. In most places, however, the Dandridge soil is not acid. It is ½ to 2½ feet deep to calcareous shale, and small calcareous fragments of shale are common on the surface. Because soils of this unit are shallow to bed rock, they have a low capacity to supply moisture to plants and are very droughty.

Present use and management.—About 80 percent of the acreage has been cleared and cultivated. A large part of the cleared acreage is used for unimproved pasture. A significant acreage is idle. Hay, mainly lespedeza, and corn are the chief crops. Small grains are grown on a few farms. A small acreage is in alfalfa.

Use suitability and management needs.—These soils are suited to most of the common crops and pasture plants. Because they are shallow and sloping, they are only moderately well suited to row crops. Ryegrass, bermudagrass, fescue, and sericea lespedeza are among the better suited pasture plants. Early maturing crops are more suitable than are late maturing crops. Because they are droughty in dry periods, these soils have low carrying capacity. The Dandridge soil is better suited to pasture than are the other soils of this unit.

Suitable rotations should be long and should consist chiefly of close-growing crops. If row crops are grown, they should not be grown more often than once in 4 years. In places where it is not feasible to grow row crops, a suitable rotation consists of a fall-sown grain and 3 or 4 years of legumes and grasses grown for hay or pasture. If adequately fertilized, red clover and orchardgrass grow fairly well. Good stands of alfalfa can be obtained on the better parts of these soils if they are adequately fertilized, but yields are limited because the water-supplying capacity is low.

The Dandridge soil needs less fertilizer than the rest of the soils of this unit. It needs mainly applications of phosphate. The other soils, however, need moderate applications of lime and phosphate, and plants grown on these soils will benefit from additions of potash and nitrogen.

Except for the Colbert soil, good tilth generally is not difficult to maintain. The Colbert soil generally has poor tilth, and the many rock outcrops make cultivation difficult. Some of the other soils, especially the more severely eroded parts, are difficult to cultivate because the plow layer contains much shale and the profile is shallow to the shale bedrock. In many places where the shale is at a shallow depth and is not massive hard rock, it is practical to break the shale by deep tillage. This operation increases the depth of permeable material.

Because the loss of even a small amount of soil material is important on these shallow soils, the rapid runoff must be controlled. Keeping the soils in close-growing vegetation is probably the most effective way to reduce soil losses through erosion. If row crops are grown, the water must be controlled by supplemental means. Cultivation should be on the contour, and the natural drainways should be kept in sod. Stripcropping should be used on the longer slopes.

Capability unit IIIw-1

The soils of capability unit IIIw-1 (table 17) occur on first bottoms and are poorly drained. They are nearly level to slightly depressed, and their runoff and in-

ternal drainage are slow. They are likely to be flooded at times. The fluctuating water table is near or at the surface during periods of high rainfall. Much water seeps from the adjacent upland slopes to many areas along the rims of broad flood plains.

These soils generally have an 8-inch grayish-brown surface layer that overlies a gray or gleyed layer. They are about moderate in natural fertility. They range from medium acid to slightly acid. All of these soils are deep to bedrock.

Present use and management.—Most of the acreage of these soils has been cultivated. Much of it is now used for pasture; a small part is used for corn and hay. A few areas are in high-yielding Ladino clover-fescue pasture. Only a few areas have been improved by artificial drainage (fig. 2).

***Figure 2.*—Drainage improvement on Melvin silt loam.**

Crop yields are rather low and, because of excess water, the corn crops commonly fail.

TABLE 17.—*Soils of capability unit IIIw-1: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Lespedeza		Pasture	
	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:						
Melvin silt loam	25	45	0.7	1.8	55	125
Prader silt loam	25	40	.6	1.7	55	125
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]						
Nitrogen (N)	6	18	0	9	0	15
Phosphoric acid (P_2O_5)	12	36	0	18	0	30
Potash (K_2O)	12	36	0	18	0	30

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years.

Use suitability and management needs.—Unless artificially drained, these soils are poorly suited to most crops, and much of the acreage is poorly suited to pasture. The most suitable plants are fescue, white clover, Ladino clover, and alsike clover.

The chief need for the improvement of these soils is improved drainage. Substantial fertilization and the use of water-tolerant plants can improve the pasture to some extent, but the grazing would be mainly limited to rather short summer periods when the water table is low. If these soils are adequately drained and fertilized, suitable grasses and legumes can produce pasture of a high carrying capacity. Artificial drainage would also broaden the suitability for use; corn, soybeans, and other row crops, and red clover, timothy, and other hay crops could be grown.

The practicability of artificial drainage depends on several factors. Some of these are (1) the availability of an adequate outlet for drainage water; (2) the permeability and rate of lateral movement of water in the soil; (3) the cost of installing the drainage system compared to the value of increased production; and (4) the need for additional cultivated acreage.

Capability unit IVe-1

The soils of capability unit IVe-1 (table 18) are deep to moderately deep and well drained. These moderately steep soils developed chiefly from sandy materials. All the soils are practically stone free except the Fullerton soils, which contain moderate amounts of fine chert.

These soils have a friable silt loam, loam, or fine sandy loam surface soil. Their subsoil is friable clay loam or silty clay loam. Except for a few areas of the Christian and Tellico soils, almost all of the acreage is 3 feet or more deep to bedrock.

These soils absorb water rapidly. They have a high water-supplying capacity. Because of the strong slopes, runoff develops quickly, and all the soils erode easily when not protected. Natural fertility ranges from low to moderately high. These soils range from medium acid to strongly acid.

Present use and management.—About 85 percent of the acreage of these soils has been cultivated. All of the common crops are grown to some extent, but much of the acreage is used for hay and pasture. Lespedeza is the most important hay crop. Some alfalfa is grown, mainly on the Waynesboro and Alcoa soils. Pastures are chiefly unimproved and consist mainly of lespedeza and volunteer plants. Fertilization has been light, but a large part of the acreage has received some lime.

Use suitability and management needs.—These soils are suited to practically all of the common crops and pasture plants. If adequately fertilized and limed, the permanent pasture has high carrying capacity. Partly because of the friable surface soil, cattle can remain on pasture longer on these soils than they can on Decatur, Dewey, and other clayey soils.

Chiefly because of the strong slope and the erosion hazard, these soils are limited in their suitability to long rotations consisting chiefly of close-growing crops. If used in 4- to 6-year rotations, these soils are suited to corn, tobacco, vegetables, and other row crops. A

TABLE 18.—*Soils of capability unit IVe-1: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Alcoa loam, eroded moderately steep phase	26	44	12	20	0.9	1.4	2.1	3.0	1,150	1,700	70	105
Allen fine sandy loam, moderately steep phase	22	40	9	17	.6	1.3	1.7	2.2	1,100	1,600	50	95
Allen silt loam, moderately steep phase	23	42	10	18	.7	1.4	1.9	2.3	1,050	1,550	50	95
Christian loam, moderately steep phase	22	40	10	18	.5	1.1	1.7	2.2	950	1,350	50	95
Christian loam, eroded moderately steep phase	20	37	9	17	.5	1.0	1.7	2.1	950	1,300	50	95
Fullerton cherty silt loam, moderately steep phase	21	38	10	18	.7	1.3	1.9	2.4	950	1,350	45	95
Fullerton cherty silt loam, eroded moderately steep phase	19	36	10	17	.6	1.3	1.8	2.3	900	1,300	40	95
Jefferson fine sandy loam, moderately steep phase	20	38	9	17	.6	1.3	1.6	2.1	1,200	1,600	45	95
Muse silt loam, eroded moderately steep phase	22	42	10	17	.7	1.3	1.7	2.4	1,100	1,500	60	95
Tellico loam, eroded moderately steep phase	22	40	11	19	.7	1.3	2.1	2.8	1,000	1,350	60	100
Waynesboro loam, eroded moderately steep phase	25	38	11	18	.7	1.3	2.1	2.8	1,000	1,400	55	100
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	6	18	0	12	0	9	12	27	48	72	6	18
Phosphoric acid (P_2O_5)	12	36	0	24	0	18	24	54	96	132	12	36
Potash (K_2O)	12	36	0	24	0	18	24	54	96	132	12	36

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rate is for seeding; annual applications of phosphate and potash may be needed for maintenance.

rotation of corn, a small grain, and legume-and-grass hay or pasture for about 4 years is well suited. The rotations can consist entirely of small grains and legume-and-grass hay and pasture. Adequate fertilization with all plant nutrients is required for successful growth of all crops. If these soils are well fertilized and otherwise well managed, high yields of the common crops will be obtained. They have favorable available moisture-holding capacity that allows them to make maximum use of the applied fertilizers.

Supplemental practices for water control are very important on these strongly sloping soils. Cultivation on the contour helps prevent water from collecting in channels and allows more water to enter the soil. Stripcropping on suitable slopes restrains runoff and erosion losses and increases the yields of row crops by improving the moisture supply. All natural drainways should be established and kept in sod.

The friable surface soils have good tilth that is not difficult to maintain. The Fullerton soils have some chert on the surface and are not so easy to work as the other soils in this group. All of the soils can be worked over a fairly wide range of moisture content without injury to tilth.

Capability unit IVe-2

The soils of capability unit IVe-2 (table 19) are deep and well drained. They have developed from high-grade, fine-textured limestone material. They have a heavy silt loam to silty clay loam surface soil and a red to dark-red, firm, plastic subsoil. They are moderately steep or hilly. Nearly all areas are more than 3 feet deep to limestone bedrock. The Cumberland, Decatur, and Dewey soils have fairly high fertility, but the fertility of the Dunmore soils ranges from medium to low. All are medium acid to strongly acid.

Because of their great depth and large volume of internal pore space, these soils absorb large quantities of water. Much of this water, however, is held tightly by the clay particles and is difficult for plant roots to obtain. These soils, therefore, supply less water than do the soils of group IVe-1, but because they are more fertile, their yields are higher. Because of the moderately steep slopes and slower infiltration, these soils have rapid runoff and are highly susceptible to sheet erosion.

Present use and management.—About 85 percent of the acreage of these soils has been cultivated. All of the common crops are grown to some extent, and a large acreage is used for hay and pasture crops. Corn occupies a significant acreage, and small grains are extensively grown. Alfalfa is an important hay crop. The use of fertilizer has been more common than on most other soils in the county, and most of the acreage has been limed. The Cumberland, Dewey, and Decatur soils, particularly, have been kept at fairly high fer-

TABLE 19.—*Soils of capability unit IVe-2: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:												
Cumberland silty clay loam, eroded moderately steep phase	26	43	13	22	0.9	1.4	2.3	3.1	1,100	1,350	70	110
Decatur silty clay loam, eroded moderately steep phase	25	42	13	22	.9	1.4	2.5	3.2	1,000	1,300	70	110
Dewey silt loam, moderately steep phase	25	42	13	22	.9	1.5	2.4	3.2	1,000	1,350	70	110
Dewey silty clay loam, eroded moderately steep phase	23	40	13	22	.8	1.4	2.4	3.1	950	1,300	65	105
Dunmore silt loam, moderately steep phase	23	40	11	18	.7	1.4	2.2	3.0	950	1,400	50	100
Dunmore silty clay loam, eroded moderately steep phase	21	38	10	18	.7	1.3	2.2	3.0	900	1,300	45	100
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]												
Nitrogen (N)	12	24	6	12	0	12	15	27	48	72	9	18
Phosphoric acid (P_2O_5)	24	48	12	24	0	24	30	52	96	132	18	36
Potash (K_2O)	24	48	12	24	0	24	30	52	96	132	18	36

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rate is for seeding; annual applications of phosphate and potash may be needed for maintenance.

tility. Very little tobacco is grown. Yields are relatively high, particularly for pasture and hay crops.

Use suitability and management needs.—These soils are suited to all of the common crops, including alfalfa, red clover, and other deep-rooted legumes. They are probably the best soils in the county for alfalfa. Because of the strong slopes, these soils are best suited to hay and pasture plants. If adequately fertilized and limed, they produce pasture of high quality.

Row crops are grown successfully, but they should not be grown more than once in 5 or 6 years. A rotation consisting of a row crop, a small grain, and then legume-and-grass hay or pasture for about 5 years is well suited. A rotation consisting entirely of close-growing crops is beneficial in stabilizing the soil and in using the available water effectively. A stripcropping rotation is effective in controlling runoff and erosion and in making better use of water (fig. 3). Any of the common row crops or hay and pasture plants can be used in the rotation.

Because moisture supplies are normally low in the later part of the growing season, corn or other late-maturing crops are not so well suited as the earlier maturing crops, such as small grains. Moderate yields of row crops, however, are ordinarily obtained. Cultivation on the contour will help conserve water and will prevent the soil material from washing away. Natural waterways should be kept in sod.

These soils need a little less fertilizer than do many other soils of the county. They respond well to adequate fertilizer, especially organic matter, phosphate, and lime.

Figure 3.—Stripcropping on sloping and moderately steep Decatur soils. Alfalfa on Hermitage soils in foreground. Woods on Lehew soils on ridge in background.

Because these soils contain much clay in the surface soil, they have only fair tilth. They cannot be tilled over so wide a range of moisture content as can the sandier more friable soils. They tend to clod or puddle when worked while wet, and they become rather hard when dry. Within the proper range of moisture content, however, the soils are rather easy to work.

Capability unit IVe-3

The soils of capability unit IVe-3 (table 20) are yellowish red to red and well drained. They are severely eroded, and the present surface layer consists largely

of subsoil material. Most of the acreage is on moderately steep slopes, but a small part is on slopes of 5 to 12 percent.

These soils are generally more than 2 feet deep to limestone or sandstone bedrock. The present surface soil is yellowish-red or red friable clay loam or silty clay loam. The subsoil is similar to the surface soil, but it may be slightly higher in clay.

These soils are medium to low in fertility, very low in organic matter, and strongly acid. Even in their eroded condition, they are permeable; but because they have lost most of their friable loamy surface soil, their capacity to supply moisture and their tilth have been lowered.

Present use and management.—All of the acreage of these soils has been cultivated. A large part is now used for unimproved pasture or is idle. Corn and small grains are grown on a small acreage. Many areas have reverted to Virginia pine, and a small acreage has been established in permanent pasture.

Use suitability and management needs.—The moderately steep slope and high susceptibility to further erosion narrow the use suitability of these soils. They are probably best suited to permanent vegetation.

Row crops can be grown successfully in a rotation lasting about 6 years, but a high level of management is needed to obtain maximum sustained yields. Corn is the most suitable row crop for the long rotation. Small grains and all the hay and pasture plants can be grown. A suitable rotation that will improve the soil is a close-growing crop, such as a small grain, and then grass-and-legume pasture or hay for about 5 years. All of these soils respond well to fertilization and good management. They are low in plant nutrients, but if the fertility is raised by applying fertilizer and turning under of crop residues, good yields can be obtained.

Because these soils contain a large amount of clay in the surface layer, they clod or puddle if worked when wet. They are not so difficult to work, however, as the heavier limestone soils. Particular care should be taken to prevent runoff water from collecting in channels; any gullies that now exist should be filled or stabilized. All of these soils are more susceptible to gully erosion than to sheet erosion, probably because they contain much sand. Cultivation on the contour helps to restrain runoff and to allow more water to enter the soil. Leaving natural drainways in sod helps to prevent gullies from forming. Where long rotations need to be used, stripcropping helps to maintain the soils.

If additional cropland is not needed, these soils probably can best be used for permanent pasture. All the common pasture plants can be grown, including orchardgrass, fescue, ryegrass, bermudagrass, white clover, Ladino clover, and sericea lespedeza. If these soils are well fertilized, pastures of high quality and good carrying capacity can be maintained. Because these soils are more droughty than are the less severely eroded soils, the growth of pasture plants is slow during dry periods.

All of these soils produce forest. Shortleaf pine and loblolly pine are among the better suited trees.

Capability unit IVe-4

The soils of capability unit IVe-4 (table 21) are yellowish red and red. Most of them are severely eroded. These soils are mainly hilly or moderately steep. A very small acreage is sloping or rolling.

The original silt loam surface soil of most of these soils has been largely removed, and the plow layer is firm silty clay. Even in the less severely eroded soils of this unit, the original surface soil is thin and the clayey layer is near the surface. Over most of the acreage, the

TABLE 20.—*Soils of capability unit IVe-3: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Pasture	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:										
Allen silty clay loam, severely eroded moderately steep phase	12	27	6	13	0.3	0.9	1.1	2.1	30	75
Allen clay loam, severely eroded moderately steep phase	10	29	5	12	.3	.9	.9	1.9	25	75
Christian clay loam, severely eroded moderately steep phase	9	25	5	11	.3	.8	.8	1.6	25	60
Christian clay loam, severely eroded sloping phase	10	28	6	12	.4	.8	.8	1.7	30	65
Tellico clay loam, severely eroded moderately steep phase	11	27	5	14	.3	.9	1.1	1.9	30	75
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]										
Nitrogen (N)	6	18	0	12	0	9	12	27	6	15
Phosphoric acid (P_2O_5)	12	36	0	24	0	18	24	54	12	30
Potash (K_2O)	12	36	0	24	0	18	24	54	12	30

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rate is for seeding; annual applications of phosphate and potash may be needed for maintenance.

soils are deep to bedrock. The Talbott soils are shallower than the other soils of this unit.

These soils are rather slowly permeable, but they have good internal drainage. They are very low in organic matter and are medium acid to strongly acid. Their fertility has been greatly lowered by accelerated erosion. Because of the strong slopes and the high content of clay in the surface soil, water is absorbed rather slowly and runoff is high. Because they are clayey, their moisture-supplying capacity is low and plants are injured during dry periods. Tilth is generally poor, and the soils are difficult to work and to conserve.

Present use and management.—Nearly all of the acreage of these soils has been cultivated. A few areas of the Talbott soils remain under native hardwoods. Much of the acreage is now used for pasture, and some is idle. A small part is used for corn, small grains, hay, and other crops. Yields, especially for row crops, are low. Little fertilizer is used. A significant acreage of permanent pasture, which is moderately fertilized, has been established.

Use suitability and management needs.—These soils are rather poorly suited to cultivated crops. They have poor tilth and are difficult to work and to conserve. Because of the clayey surface soil and steep slopes, rainfall is absorbed slowly and runoff is rapid. If these soils are needed for row crops, a rotation lasting at least 5 or 6 years should be used. Under careful management, most of the common plants can be grown. Because these soils contain much clay and have a low water-supplying capacity, they are not suited to such crops as tobacco and vegetables. Corn grows fairly well in a long rotation, but small grains are better suited than corn because they mature when moisture conditions are more favorable.

These soils respond moderately well to fertilizer. They are moderate to low in plant nutrients; but because of poor moisture relations, the response to fertilizer is poor, particularly during periods of low rainfall. The turning under of green-manure crops, crop residues, and barnyard manure improves tilth, moisture relations, and fertility.

Even where these soils are in pasture or close-growing crops, particular care must be taken to restrain runoff and erosion. All farming operations should be on the contour, and natural waterways should be kept in a heavy sod. Where additional cropland is needed, some areas should be stripcropped on the contour.

These soils can be made to produce pastures of high quality. All of the commonly grown pasture plants are suited. The main needs for satisfactory production are adequate fertilization and liming. Good seedbeds should be prepared for pasture because the surface soil contains much clay, and the initial establishment of pasture plants is difficult on seedbeds that have not been well pulverized.

TABLE 21.—*Soils of capability unit IVe-4: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table. Dashed lines indicate either crop is not grown under management specified or soil is unsuited to its production]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Pasture	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:										
Cumberland silty clay, severely eroded sloping phase	18	37	9	15	0.5	1.1	1.5	2.2	38	80
Cumberland silty clay, severely eroded moderately steep phase	15	33	8	14	.4	1.0	1.4	2.1	35	75
Decatur silty clay, severely eroded moderately steep phase	14	30	8	14	.4	1.0	1.4	2.1	35	75
Decatur silty clay, severely eroded sloping phase	15	33	8	14	.5	1.1	1.5	2.2	40	80
Dewey silty clay, severely eroded moderately steep phase	14	30	8	14	.4	1.0	1.3	2.1	35	75
Dewey silty clay, severely eroded sloping phase	16	33	8	15	.5	1.1	1.4	2.2	37	80
Dunmore silty clay, severely eroded sloping phase	14	33	8	14	.4	1.0	1.4	2.2	35	75
Dunmore silty clay, severely eroded moderately steep phase	13	30	7	13	.3	.9	1.3	2.1	30	70
Farragut silty clay, severely eroded sloping phase	15	32	7	15	.4	1.0	1.3	2.1	35	75
Sequoia silty clay, severely eroded sloping phase	14	32	7	13	.3	.9	1.3	2.0	30	65
Talbott silty clay, severely eroded sloping phase			6	13	.4	.8	1.2	1.9	35	70
Talbott silty clay, severely eroded moderately steep phase			5	12	.3	.8	1.1	1.9	30	65
Talbott silt loam, moderately steep phase	22	38	9	17	.7	1.3	1.9	2.8	40	85
Talbott silty clay loam, eroded moderately steep phase	20	36	9	16	.6	1.2	1.8	2.7	35	80
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]										
Nitrogen (N)	12	24	6	12	0	12	15	27	9	21
Phosphoric acid (P_2O_5)	24	48	12	24	0	24	30	52	18	42
Potash (K_2O)	24	48	12	24	0	24	30	52	18	42

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rate is for seeding; annual applications of phosphate and potash may be needed for maintenance.

All the common trees are suited to these soils. The growth of trees, however, is not so rapid as on the more friable soils. The north-facing slopes are more productive of forest than are the drier south-facing slopes.

Capability unit IVs-1

The soils of capability unit IVs-1 (table 22) are well drained, light colored, and shallow to bedrock. These soils are moderately steep or rolling. In some places the 5- to 6-inch surface layer is relatively free of shale fragments, but the rest of the acreage is shaly throughout the profile. Shale outcrops are common in the more severely eroded places.

Because of the shallow depth to shale bedrock, all the soils have a low water-supplying capacity and are droughty. Runoff develops quickly during rains, and the control of water is a problem. These soils are moderate to low in fertility; they contain a small amount of organic matter. The Dandridge soil is slightly acid to neutral, and the other soils are medium acid to strongly acid.

Present use and management.—Part of the acreage of these soils is in cutover native deciduous forest. On the cleared parts, some acreage is used for hay, small grains, and corn, but a large part is used for unimproved pasture. A significant acreage is idle. The Dandridge soils have some bluegrass-and-whiteclover pastures. Lespedeza is the most widely used plant, both for hay and pasture. Fertilization has been light, and only a small acreage has been limed.

Use suitability and management needs.—Because of their shallow depth to bedrock, these soils are not well suited to crops. Most areas are very likely to erode. Most of the acreage can support a moderate amount of grazing. The grazing ranges from fair to very good, depending on the soil and the fertilization. Bluegrass and whiteclover can be maintained on most of the soils of this unit, if proper preparation, chiefly adequate fertilization, is made. The mowing of excess herbage and weedy growth improves the pasture. Because the moisture-supplying capacity is low, much of the acreage is droughty. Consequently, the periods are limited during which pasture grows and is palatable.

Areas of these soils that are used for tilled crops cannot give high yields, especially of crops that have a long growing season. Row crops should not be grown more often than once in about 6 years. Cultivation should be on the contour, and the waterways should be kept in sod. Because they mature before the drier parts of the growing season come, fall-sown small grains are probably among the better suited crops. Fall-sown small grains are also valuable for winter grazing, but frequent tillage for seedbed preparation on the more strongly sloping parts of these soils is not feasible. Fair stands of alfalfa can be established on some of the acreage, but the total yields will be low because moisture is not adequate at times.

Capability unit IVs-2

Bruno loamy fine sand is the only member of capability unit IVs-2 (table 23). It is an undulating, extremely sandy soil on first bottoms. Most areas are likely to be flooded at times. The individual areas normally are narrow elongated strips adjacent to the stream channel. Internal drainage is very rapid, and the soil has little capacity to hold water or fertilizer. It is droughty even during normal seasons. It is low in organic matter and medium acid to strongly acid. Because of the nearly level surface and rapid infiltration, this soil is easy to conserve against erosion losses.

TABLE 22.—*Soils of capability unit IVs-1: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Alfalfa		Pasture	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:										
Dandridge silt loam, moderately steep phase	18	28	9	17	0.8	1.4	1.7	2.2	50	85
Dandridge shaly silty clay loam, eroded moderately steep phase	14	24	7	13	.6	.9	1.4	1.8	40	75
Litz silt loam, moderately steep phase	18	34	8	17	.6	1.2	1.6	2.0	45	80
Litz shaly silty clay loam, eroded moderately steep phase	14	25	7	14	.5	1.0	1.3	1.9	30	70
Montevallo shaly silt loam, moderately steep phase	14	26	7	14	.5	1.0	1.2	1.7	32	70
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]										
Nitrogen (N)	6	15	0	12	0	9	12	18	6	15
Phosphoric acid (P_2O_5)	12	30	0	24	0	18	24	36	12	30
Potash (K_2O)	12	30	0	24	0	18	24	36	12	30

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years. For alfalfa, the fertilizer rate is for seeding; annual applications of phosphate and potash may be needed for maintenance.

469687—59——6

Present use and management.—Nearly all of this soil has been cultivated. It is now used for corn, small grains, hay, pasture, and other crops. A significant acreage is idle. Yields of all crops are low.

TABLE 23.—*Soil of capability unit IVs-2: Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soil and required fertilizer	Corn		Wheat		Lespedeza		Pasture	
	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soil:								
Bruno loamy fine sand	15	25	7	10	0.3	0.6	15	35
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]								
Nitrogen (N)	0	12	0	9	0	9	0	12
Phosphoric acid (P_2O_5)	0	24	0	18	0	18	0	24
Potash (K_2O)	0	24	0	18	0	18	0	24

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years.

Use suitability and management needs.—Because this soil has a very low moisture-supplying capacity, crops do not respond well to fertilizer. If it is not irrigated, the yields of all crops will be low, even though they may be well fertilized. Small grains and other early maturing crops respond better to fertilizer than do late maturing crops. The best suited crops are drought-tolerant plants and plants that mature in the early part of the growing season when the moisture supply is more favorable. Sericea lespedeza, bermudagrass, and fescue are probably the best hay and pasture plants. Frequent light applications of fertilizer generally are more beneficial than are heavy applications spaced at long intervals.

Capability unit VIe-1

The soils of capability unit VIe-1 (table 24) are well drained, moderately deep to deep to bedrock, and generally permeable throughout their profile. The surface soil is friable and ranges from sandy loam to silty clay loam. The subsoil ranges from clay loam to clay. They generally occupy the steep slopes of relatively high and prominent ridges. The Fullerton soils contain moderate amounts of finely divided chert, but the other soils are practically stone free, although some of the steeper areas of Tellico soils have a few outcrops of bedrock. Although these soils have physical properties that favor a high moisture-supplying capacity, their moisture content is lowered because of the rapid runoff. The friable, permeable Tellico soils are highly susceptible to severe gully erosion. The soils of this unit range from medium to low in fertility and in organic matter. All are strongly acid.

TABLE 24.—*Soils of capability unit VIe-1: Estimated average carrying capacity and required fertilization at two levels of management*

[Carrying capacity in column A to be expected under management generally practiced; carrying capacity in column B to be expected under improved management. To obtain carrying capacity in A and B columns, the soils are fertilized in amounts shown in lower part of table]

Soils and required fertilizer	Pasture	
	A	B
	Cow-acre-days[1]	*Cow-acre-days*[1]
Soils:		
Dunmore silt loam, steep phase	35	80
Dunmore silty clay loam, eroded steep phase	35	75
Fullerton cherty silt loam, steep phase	35	75
Fullerton cherty silt loam, eroded steep phase	35	70
Jefferson fine sandy loam, steep phase	35	70
Tellico loam, steep phase	40	80
Tellico loam, eroded steep phase	35	80
Tellico loam, very steep phase	25	65
Tellico clay loam, severely eroded steep phase	20	60
	Lb.	*Lb.*
Fertilizer:[2]		
Nitrogen (N)	6	15
Phosphoric acid (P_2O_5)	12	30
Potash (K_2O)	12	30

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For carrying capacity in column B, 2½ tons of lime per acre are applied every 4 or 5 years.

Present use and management.—About one-third of the acreage of these soils is in badly cutover, native hardwoods. In most areas there is a slight intermingling of pine. The cleared area is used mostly for unimproved pasture, and a substantial acreage is idle. Many areas, particularly on the Tellico soils, have been abandoned and are reverting to forest, chiefly Virginia pine. Corn is grown on a very small acreage. Pasture generally consists of some lespedeza and various volunteer plants and weeds. Little fertilizer has been used.

Use suitability and management needs.—Because of the steep slopes and serious risk of erosion, these soils are not suited to crops. The many badly gullied areas indicate that the soils cannot be conserved when used for cultivated crops. Their suitability is limited to pasture and trees.

These soils should not be plowed, except for reseeding pasture, and even then tillage should be on the contour. The normally long slopes of these soils should not be plowed for their entire length when preparing a pasture seedbed. Because runoff develops rapidly, newly established pastures are likely to be destroyed. On the long steep slopes, pasture should be established over

a period of a few years by using a succession of contour strips. The pasture should be adequately fertilized and the grazing carefully controlled.

All of these soils need lime and moderate applications of complete fertilizer. The waterways in severely eroded areas should be seeded, fertilized, manured, and lightly mulched. Most of the commonly grown grasses and legumes can be used, including orchardgrass, fescue, bermudagrass, sericea lespedeza, and whiteclover.

If these soils are not needed for grazing, they should be planted to suitable trees. Pine trees generally grow best, but in some places some poplar, walnut, and other hardwoods can be grown.

Capability unit VIs-1

The soils of capability unit VIs-1 (table 25) are light colored and shallow to shale bedrock. They are steep or very steep. Some of these soils have a 4- to 5-inch surface layer that is relatively free of shale fragments, but the rest of the acreage is shaly throughout the profile. Outcrops of shale are common on the eroded soils.

These soils are moderate to low in natural fertility and contain little organic matter. Their capacity for holding moisture available to plants generally is very low. The Dandridge soils range from slightly acid to neutral; the other soils are medium acid to strongly acid.

Present use and management.—Part of the acreage of these soils is in native deciduous cutover forest. Much of the cleared acreage is used for unimproved pasture (fig. 4), a small acreage is used for hay and corn, and some is idle. Much of the more productive parts of the pasture is in bluegrass and whiteclover. Less productive parts are in broomsedge, briers, and brushy growth.

Figure 4.—Native pasture on steep Dandridge soils.

Use suitability and management needs.—Mainly because of the shallow depth to bedrock and steep slopes, these soils are not suited to row crops. Runoff is rapid, yields are low, and the soils are difficult to stabilize when used for cultivated crops. These soils are best suited to permanent pasture or for use as woodland.

TABLE 25.—*Soils of capability unit VIs-1: Estimated average carrying capacity and required fertilization at two levels of management*

[Carrying capacity in column A to be expected under management generally practiced; carrying capacity in column B to be expected under improved management. To obtain carrying capacity in A and B columns, the soils are fertilized in amounts shown in lower part of table.

Soils and required fertilizer	Pasture	
	A	B
	Cow-acre-days[1]	*Cow-acre-days*[1]
Soils:		
Bland silty clay loam, eroded steep phase	25	50
Bland silt loam, steep phase	25	55
Dandridge silt loam, steep phase	40	75
Dandridge shaly silty clay loam, eroded steep phase	30	65
Dandridge shaly silt loam, very steep phase	30	60
Montevallo shaly silt loam, steep phase	25	50
Teas loam, steep phase	30	60
	Lb.	*Lb.*
Fertilizer:[2]		
Nitrogen (N)	6	15
Phosphoric acid (P_2O_5)	12	30
Potash (K_2O)	12	30

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For carrying capacity in column B, 2½ tons of lime per acre are applied every 4 or 5 years.

These soils should not be plowed or disked except to reseed pasture plants. Pasture should be seeded in contour strips. The initial strip should be near the top of the hill so that it later affords protection for succeeding strips farther down the slope. Subsoiling on the contour increases the depth of the permeable material, improves the moisture capacity, and expands the root zone.

Most of the acreage can grow a moderate amount of pasture plants. The quality of the plants ranges from fair to very good, depending mainly upon the fertilization. Carefully controlled grazing is especially important on these soils because in dry periods, even short dry periods, pasture plants practically stop growing. Carrying capacity is fair in spring, but it is very low during the drier summer months. Fescue, ryegrass, lespedeza, and sericea lespedeza are among the more suitable plants. Whiteclover and bluegrass grow fairly well on the better parts of these soils. These plants grow naturally on the deeper areas of Dandridge soils.

Areas of these soils that are not urgently needed for pasture can be best used for forestry. Shortleaf pine and loblolly pine are suitable trees.

Capability unit VIs-2

The soils of capability unit VIs-2 (table 26) are deep and well drained. They have so many stones or cobbles on the surface and throughout the profile that cultivation is very difficult. The soil material, however, is

very permeable throughout its depth and is easily penetrated by plant roots.

Water is absorbed rapidly, but the water-holding capacity is lowered by stoniness and high porosity. The water-supplying capacity, therefore, is about moderate. These soils range from very low to medium in natural fertility. All are strongly acid.

Present use and management.—Probably 40 percent of the acreage of this group is in cutover mixed hardwoods and pine forest; the rest has been cleared and cropped at some time. At least one-half of the acreage that has been cropped is now in unimproved pasture. Many areas are idle, and some are reverting to forest, chiefly Virginia pine. A small part is in crops, mainly corn, small grains, and hay. Tobacco occupies a very small acreage. Except on the tobacco, fertilization generally has been very light.

Use suitability and management needs.—These soils are poorly suited to crops, including hay, which is difficult to mow and rake. In some places that are not too steep or stony, row crops can be grown with mixed grasses and legumes in a long rotation. The need for cropland on individual farms will largely determine whether it is feasible to cultivate these stony soils.

Under most conditions, these soils are best suited to permanent pasture or trees. Suitable plants are fescue, ryegrass, sericea lespedeza, and bermudagrass. If adequately fertilized and limed, orchardgrass, white clover, and Ladino clover can be grown. The main need of the pasture plants on these soils is adequate fertilization. Mowing is rather difficult because of the stones, and weeds are not easy to control. Because these soils are friable and well drained, they are suited to winter pasture; they can withstand trampling well during the winter grazing season.

These soils are well suited to forest. Reforestation is suggested for farms that do not lack needed pasture. Shortleaf pine and loblolly pine are well suited, and poplar, walnut, and other hardwoods can be grown in some places.

Capability unit VIIs-1

The soils of capability unit VIIs-1 (table 27) are shallow to bedrock, stony or rocky, very steep, or very severely eroded; or they have some combination of these characteristics. They are generally not suited to either crops or pasture. On most farms probably the best use is for forest. All of these soils are low in fertility, but in other characteristics they vary greatly.

Present use and management.—About 80 percent of the acreage of the soils of this group is in native forest. The greater part of this forest is in the Great Smoky Mountains National Park. Practically all of the acreage not under native cutover forest has been cleared and cropped at some time. Much of this acreage has been abandoned and has either reverted to forest by natural seeding or has been planted to trees. Virginia pine and shortleaf pine predominate on these areas, but some parts have been reforested with locust by natural seeding.

In the Great Smoky Mountains National Park, the forest is protected from fire and grazing, and good management practices are used. In other places little is done to safeguard forests from fire and grazing. Abandoned land that was once cropped continues to be naturally revegetated by trees, and small acreages are being planted, chiefly to pine. The part of the formerly cropped acreage that is not reverting to forest or is not being planted to trees is used chiefly for unim-

TABLE 26.—*Soils of capability unit VIs-2:. Estimated average acre yields and required fertilization at two levels of management*

[Yields in columns A to be expected under management now generally practiced; yields in columns B to be expected under improved management. To obtain yields in columns A and B, the soils are fertilized in amounts shown in lower part of table. Dashed lines indicate either crop is not grown under management specified or soil is unsuited to its production]

Soils and required fertilizer	Corn		Wheat		Lespedeza		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Soils:										
Allen cobbly fine sandy loam, moderately steep phase	18	28	7	14	0.5	0.9	.....	.....	35	65
Allen cobbly silt loam, moderately steep phase	18	28	6	14	.5	.9	.....	.....	35	65
Hayter stony silt loam, gently sloping phase	25	38	9	16	.6	1.0	950	1,450	40	75
Hayter stony silt loam, sloping phase	22	36	8	15	.5	1.0	900	1,350	35	70
Jefferson cobbly fine sandy loam, moderately steep phase	18	28	6	14	.4	.9	.....	.....	30	60
Jefferson cobbly fine sandy loam, sloping phase	20	30	6	14	.5	1.0	900	1,300	35	60
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fertilizer:[2]										
Nitrogen (N)	6	12	0	9	0	9	27	48	6	18
Phosphoric acid (P_2O_5)	12	24	0	18	0	18	54	96	12	36
Potash (K_2O)	12	24	0	18	0	18	54	96	12	36

[1] Number of days during grazing season that 1 cow can be be grazed on 1 acre without injury to the pasture.

[2] Pounds per acre yearly of nitrogen, phosphoric acid, and potash. For yields in columns B, 2½ tons of lime per acre are applied every 4 or 5 years.

proved pasture. This pasture is managed at a low level, and yields are low.

TABLE 27.—*Soils of capability unit VIIs-1: Estimated average carrying capacity at two levels of management*

[Carrying capacity in column A to be expected under management now generally practiced; carrying capacity in column B to be expected under improved management. Dashed lines indicate either pasture is not grown under management specified or soil is unsuited to its production]

Soils	Pasture	
	A	B
	Cow-acre-days[1]	*Cow-acre-days*[1]
Gullied land, limestone material	.....	.....
Gullied land, shale or sandstone material	.....	.....
Lehew very fine sandy loam, very steep phase	.....	.....
Ramsey stony fine sandy loam, very steep phase	.....	.....
Ramsey slaty silt loam, very steep phase	.....	.....
Ramsey slaty silt loam, steep phase	25	45
Rockland, limestone, sloping	.....	.....
Rockland, limestone, moderately steep	.....	.....
Rockland, slate or quartzite, steep	.....	.....
Stony colluvial land	.....	.....
Talbott-Colbert very rocky silty clay loams, eroded moderately steep phases	20	35
Talbott-Colbert very rocky silty clay loams, eroded sloping phases	20	40

[1] Number of days during the grazing season that 1 cow can be grazed on 1 acre without injury to pasture.

Use suitability.—The suitability of these soils is generally limited to forest. The rocky Talbott-Colbert soils and the Ramsey slaty soils can grow a small amount of pasture vegetation (fig. 5), chiefly in spring. They are not particularly suited to pasture, however, and should be planted to trees unless pasture is urgently needed. Because of the many limestone outcrops, pasture is difficult to mow.

Figure 5.—Native pasture on Talbott-Colbert very rocky silty clay loams.

Forest Management

Changes in forest management are needed in Blount County to prevent the deterioration of the forest resources. Management should be directed toward (1) preventing fires; (2) prohibiting grazing; and (3) using proper harvesting methods. Fire control is needed to protect the trees and to protect the forest litter, which restrains runoff and helps keep the soil porous. The browsing of livestock kills the young replacement trees, and trampling compacts the soil and destroys humus. Consequently, the soil becomes less porous and less moisture is absorbed. The purpose of proper harvesting is to keep desirable trees in a condition so that they will grow vigorously.

Average forest land is not of much value for grazing. According to Indiana experiments, the grazing of woodland does not pay when 2 to 6 acres are allowed for each animal unit that is grazed without supplemental feeding. Under such a system of grazing, the animals deteriorated in 6 months (*5*).

The improvement of woodland is an important part of forest management. It involves the removal of cull and weed trees; trees that are unsound, crooked, short, bushy topped, and slow growing; and trees that have little or no commercial value. This removal permits a more rapid growth of the straight, tall, well-crowned trees that are free of defects. Much of the inferior timber that is removed can be used for fuel and pulpwood. By selective cutting, the better trees are removed according to their stage of maturity, instead of cutting the entire stand at one time. By proper harvesting, the cut timber is removed in a way that least damages the remaining trees and least impedes reproduction.

Areas denuded of their forest may be reforested in places by natural or volunteer seeding. In other places, planting is required. For natural seeding, seed trees of desirable species must be in the vicinity, and the ground must be in a condition favorable for germination. Shortleaf pine commonly reseed on abandoned land. Virginia pine is an especially prolific producer of seed and can grow in dry and less favorable sites. Loblolly pine is more scarce than shortleaf pine or Virginia pine. Because of its rapid growth, the use of loblolly pine should be encouraged.

Where desirable trees do not seed naturally, planting is necessary. Tree planting requires certain advance preparation, and each situation presents a specific problem. This preparation includes such measures as breaking and mulching galled areas, building low check dams of brush in gullies, and plowing contour furrows.

Species that are selected for planting must be suited to the soil and to the exposure, elevation, and other features of the site. Although farmers often use locust because their farms need fence posts, pine generally is better suited to the severe growing conditions common to most areas designated for planting to forest. Loblolly pine is one of the pines most wanted for planting, because it has rapid initial growth and gives a heavy cast of leaf litter. Furthermore, it is of relatively high value when harvested. For loblolly pine, those areas

are preferred that have more favorable moisture relations, favorable aspect of slope, and good depth to bedrock.

For somewhat drier sites, shortleaf pine is well suited, and for the most unfavorable sites, such as south-facing steep slopes that are shallow to bedrock, Virginia pine is probably best suited. On the more favorable sites the interplanting of loblolly pine and shortleaf pine is suggested. Loblolly is the more desirable tree, but shortleaf pine sprouts following a fire, thereby preventing complete loss of the forest cover.

Yellow-poplar and black walnut should be used only on choice sites and should be mixed with other species. Black locust can be planted in gullies where well-drained wash has accumulated behind check dams. Shortleaf pine is more suitable than loblolly pine on the denuded parts of gullied areas and on severely eroded tracts.

Forest is beneficial to the soil, particularly in areas that are likely to erode. A protective layer of forest litter absorbs the impact of the falling drops of water and thus preserves the tiny pores and channels between the soil particles as the water moves downward. Fungi, bacteria, and tiny animals consume the litter and each other, and a dark-brown colloidal substance called humus is formed. This humus improves both structure and fertility when it is carried downward into the mineral soil by percolating water. The litter and humus have, in addition, a great capacity to absorb water.

Results obtained at the erosion station near Statesville, N. C., show an average annual loss in virgin woods of only 0.002 ton of soil per acre through erosion and an annual loss of 0.06 percent of the rainfall through runoff (*4*). A woods plot that was burned twice yearly showed a loss of 3.08 tons per acre and 11.5 percent of the rainfall, compared to a soil loss on an unburned plot of 0.001 ton per acre and a runoff loss of 0.06 percent. Similar experiments for a 9-year period on cultivated land, pasture land, and forest land at Zanesville, Ohio, show a runoff loss of 20.6 percent on cultivated land, 13.8 percent on pasture land, and 3.2 percent on forest land. The soil loss through erosion was 17.18 tons on cultivated land, 0.10 tons on pasture land, and 0.01 tons on forest land (*3*).

These experiments show that both erosion control and maximum absorption are the result of a complete forest cover. Soil that supports old forest growth is more porous and absorbs water more rapidly than does the soil in cultivated fields. Where the forest cover is properly maintained, soil that supports second-growth forest does not lose its porosity unless it is overgrazed or unless the litter is destroyed by fire (*2*).

Soil Associations

Soils occur in characteristic positions on the landscape and in characteristic geographic association with other soils. The Dandridge soils, for example, occur on shaly ridges in a highly dissected, hilly to steep landscape and are associated with narrow strips of Whitesburg and Hamblen soils. Likewise, the Emory soils occur on local alluvium in depressions and along drainways, generally in association with Decatur and Dewey soils. Soils of one or more different series occurring in a regular pattern are called a soil association. It may consist of only a few or many soils. These soils may be similar or they may be quite different. In each soil association, however, there is a striking uniformity of the soil pattern.

The association in which a soil occurs commonly influences greatly its present use, potential use, and agricultural importance. For example, a soil physically well suited to corn and other crops may or may not be used for them, depending on whether or not it is associated with soils poorly suited to these crops.

To use the soil survey to best advantage in general land planning and for other uses, it is important to know the physical characteristics, distribution, and extent of the separate soil units, their suitability for various uses, and their management needs. It is also important to know their association, or the geographic soil group in which they occur. Such information is valuable in understanding the distribution of soils, interpreting their present use, and planning their future use.

The soils of Blount County have been placed in 13 soil associations. The distribution and extent of these associations are shown on the colored soil association map at the back of this report.

A brief description of each association follows. More detailed information about the individual soils in the associations can be obtained from the detailed soil map and by reading in the subsection, Descriptions of Soils.

Dewey-Decatur-Dunmore Association (No. 1)

The Dewey-Decatur-Dunmore association makes up about 22 percent of the county. It is important to the agriculture of the area because it has a large acreage of suitable cropland. The area is prevailingly rolling to hilly and has a very irregular pattern of dendritic drainage that is modified by sinks and subterranean streams.

The Decatur, Dewey, and Dunmore soils occupy most of the association. They appear to be almost equal in acreage. Because the association borders the Tennessee River on the north, a small acreage of terrace soils is included. These terraces consist mainly of Cumberland, Waynesboro, and Etowah soils. The Emory and Hermitage soils occur on most of the foot slopes and along narrow intermittent drainways. These soils cover a significant acreage in the association. Other less extensive soils are the Greendale, Pace, Minvale, Lindside, and Melvin. Practically all of the first bottoms in the association consist of soils of the Lindside and Melvin series.

The soils are productive and physically well suited to the agriculture of the county. Nearly all of the association is in farms, and a fairly large part is in crops and pasture. A significant acreage is idle, however, or is being used for unimproved pasture. Practically all of the small amount of forest remaining in the association is in small tracts of farm woodland. Most of the

forest is upland hardwoods, which include a few shortleaf pine and Virginia pine.

The well-built and well-kept farm buildings and fences indicate that the farms in this association are among the most prosperous in the county. The average farm appears to consist of about 60 acres. The agriculture is diversified. Corn, small grains, livestock, and livestock products are produced for sale and for home use. Burley tobacco, livestock, and livestock products are the chief products produced for sale.

This association is apparently very well suited to livestock farming. Productive pasture soils are plentiful, and most farms have enough colluvial land or undulating to rolling uplands to grow feed crops and tobacco. The choice of enterprises, although rather broad, is limited by the problem of conserving the rolling to hilly uplands. The present level of management is not adequate for high production or to maintain the soils, but there is a trend toward better use of the land. Many successful farms indicate that generally a much higher level of management would be practical.

Dunmore-Pace-Greendale Association (No. 2)

The Dunmore-Pace-Greendale association covers about 5 percent of the county. It consists of six separate areas. One of these areas is in the extreme northwestern corner of the county bordering the Tennessee River; the others are scattered in the Great Valley, mostly in the northeastern part of the county. All of the area is underlain by dolomitic limestone, which ranges from low to moderately high grade.

The topography, dominantly rolling to hilly, is characterized by short hill slopes with broad smooth tops. The drainage pattern is dendritic and highly irregular. It is modified by sinks and subterranean streams. Because of these subterranean streams, a large part of the area has no surface water.

The area in the northwestern corner of the county differs slightly from the other areas; here the topography is hilly to steep and the uplands consist of cherty Fullerton soils. In the other areas, the Dunmore soils occupy nearly all of the uplands. The Dunmore soils contain little or no chert. A few spots of Fullerton soils, however, may be intermingled with the Dunmore soils. The Pace and Minvale soils are on the foot slopes and benches, the Greendale soils are along the narrow drainways, and the Lindside and Melvin soils are on the first bottoms. Most of the bottoms are Lindside soils. The Melvin soils generally occur as narrow strips along the rims of the broader flood plains.

This association is somewhat less suitable for general farming than the Dewey-Decatur-Dunmore association. The natural fertility is lower, and, in some areas, the strong slope and chertiness are unfavorable. This association can support vegetation of high quality, especially grasses and legumes.

Most of the acreage is now cleared. The forested areas consist of small individual farm woodlots. The area is now used for the general field crops. Pasture, corn, and hay are the chief crops. The most important hay crop is lespedeza, although some alfalfa is grown on the Dunmore soils.

Sequoia-Litz-Hamblen Association (No. 3)

The Sequoia-Litz-Hamblen association occupies about 10 percent of the county. It consists predominantly of soils that are shallow and moderately deep over leached shale. The area is rolling to hilly and has short, moderately steep slopes with rather broad, gently sloping and rolling tops. It has a well-defined pattern of dendritic drainage.

The Sequoia soils occur on most of the smooth hilltops and make up about 60 percent of the total acreage. The Litz soils predominate on the strong slopes, and the Muse, Leadvale, Hamblen, and Prader soils occupy most of the alluvial-colluvial strips. The Muse and Leadvale soils are on the benches and foot slopes, and the Hamblen and Prader soils are along the drainways below them. Very little well-drained soil occurs on the narrow bottoms; most of this acreage consists of imperfectly drained Hamblen soils.

About 80 percent of the area has been cleared. Pasture, corn, small grains, and hay are the most extensive crops. Tobacco occupies a small acreage, but probably it is the most important cash crop. Pastures are largely unimproved, and lespedeza is the chief hay crop. A large acreage is idle each year, and many small areas have reverted to forest, chiefly Virginia pine.

Strong slope, shallow depth to bedrock, droughtiness, low fertility, and erosion are common soil characteristics throughout much of the area. Careful management is necessary if the productivity of the soils in this association is to be built up and maintained. The bottom-land soils and those on foot slopes and benches are generally suited to short rotations or intensive use if their fertility is maintained.

Tellico-Alcoa-Neubert Association (No. 4)

The Tellico-Alcoa-Neubert association occupies about 8 percent of the county. It has a series of relatively high parallel ridges and narrow intervening valleys, all of which run in a southwest-northeast direction. The areas are highly dissected by a well-developed pattern of dendritic drainage. The association consists of hilly to steep soils, many of which are relatively shallow to the calcareous sandstone or sandy shale bedrock. They are reddish, sandy, and permeable.

The Tellico soils occur on most of the ridges, and the Christian, Alcoa, and Neubert soils probably occupy most of the acreage of the intervening valleys (fig. 6). Along the narrow drainways are the Neubert soils. The Alcoa soils are on the foot slopes and benches. The Christian soils occupy some of the lower hills in the valleys. On the north-facing slopes of some of the ridges are small areas of Litz soils. The Staser, Hamblen, and Prader soils are on the first bottoms, but the acreage of first bottoms is relatively small. The bottoms are narrow flood plains along small creeks and branches.

An estimated 60 percent of the association has been cleared. The rest is in cutover forest. A large acreage

Figure 6.—Typical view of Tellico-Alcoa-Neubert soil association. Many areas of the highly erosive Tellico soils are in forest or are reverting to forest. Young Neubert soils (foreground) are used intensively for crops.

has been abandoned and has reverted to Virginia pine. The upland soils are highly susceptible to erosion; this association has had more erosion losses than any other association in the county. The cleared uplands are used largely for unimproved pasture. A few areas are used for corn, small grains, and other crops. Most of the crops are grown on the foot slopes and in the narrow areas of bottom-land soils.

The smoother parts of the uplands that are deep enough over bedrock and the bottom-land strips are well suited to the common crops. A large part of the uplands has steep slopes, shallow depth, or both. This acreage is suited only to pasture or forestry. On most farms the acreage of suitable cropland is small.

Cumberland-Etowah-Emory Association (No. 5)

This association covers about 2 percent of the county. It consists of alluvial soils, chiefly on high terraces, but associated soils of the first bottoms and low terraces are included in places. Although the first bottoms and low terraces make up only a small part of the total area, they are important to farming because of their high productivity. The association has many small areas along the Tennessee and Little Rivers, mostly in the meanders of these streams. The separate areas generally consist of an irregular strip or belt of nearly level bottom land adjacent to the river channel and a higher, somewhat broader area of undulating and rolling stream terraces. The soils generally are red or brown, deep, and well drained.

The Staser, Hamblen, and Lindside soils occupy most of the bottom lands. Undulating and rolling Cumberland, Etowah, and Waynesboro soils predominate on the stream terraces. The terraces are hilly in some small spots, but on the whole they are fairly smooth. Emory soils occupy the narrow strips along intermittent drainways and in sinks or depressions.

Practically all of the acreage of this association has been cleared and cropped. It is used for all crops common to the county. Much of the bottom land is used intensively for crops, chiefly corn, although hay and small grains are also grown to some extent. Rotations are common on the stream terraces, where corn, small grains, tobacco, hay, and pasture are commonly grown. General livestock farming, supplemented by a cash crop, usually tobacco, prevails.

This association is one of the most productive of the county. The fertility, especially of the bottom-land soils, is easily maintained. The soils of the terraces are well suited to a wide variety of crops without exacting management.

Farragut-Sequoia Association (No. 6)

The Farragut-Sequoia association occupies undulating to rolling valley positions. It consists of several separate areas scattered throughout the central part of the Great Valley portion of the county. These areas make up about 1 percent of the county.

The association consists of moderately deep and deep soils overlying shale or shaly limestone. A pattern of intermingled Farragut and Sequoia soils occupies most of the uplands; the Farragut soils are probably predominant. Hermitage and Muse soils are on most of the foot slopes and benches, and Emory soils are most common on the narrow strips along the drainways. The small acreage of bottom lands consists of Hamblen, Prader, Lindside, and Melvin soils.

Practically all of the acreage of this association has been cleared and cropped. Most commonly grown are small grains, hay, and pasture. Only a very small acreage is used for corn, tobacco, or other row crops. A sizeable acreage is in nonfarm use. The city of Alcoa and the aluminum plants occupy a large acreage in the association.

This association is suited to all the grasses and legumes. Most of the common row crops can be grown in long rotations, but most areas cannot be intensively cropped because of the strong slopes, eroded areas, and clayey subsoil. The bottom-land strips can be used intensively, but many areas are not well drained. This association probably is best suited to livestock farming.

Talbott-Colbert-Lindside Association (No. 7)

The Talbott-Colbert-Lindside association occupies about 4 percent of the county. It is located in the northwestern part. The area is prevailingly rolling to hilly and has a very irregular pattern of dendritic drainage that is modified by frequent sinks and subterranean streams. Much of the association has a karst, or hummocky, topography.

Practically all of the soils of this association were derived from a highly argillaceous limestone. They are shallow and extremely firm. Outcrops and ledges of limestone are common in practically all places. They range from a small area of outcrops in the Talbott soils to more than 50 percent of the surface in the Rockland types.

The Talbott soils probably are the most extensive in this association, but there is a large acreage of the Rockland types. The Colbert soils are relatively inextensive. Emory and Hermitage soils occupy a significant acreage on most of the foot slopes and along nar-

row intermittent drainways. The first bottoms are occupied by the Lindside and Melvin soils, but most of the larger areas of bottom lands in this association are now flooded by Fort Loudoun Lake. A few areas of soils on high terraces, mainly Etowah, Cumberland, and Waynesboro, occur in the extreme northern part of the association adjacent to Fort Loudoun Lake. Other less extensive areas are occupied by the Decatur soils, which were derived from Holston marble.

Areas suitable for cultivation within this association are limited, chiefly because of shallow depth. Some areas of the Talbott soils are suitable for crops, but most of these areas are small, and in many places they are surrounded by larger areas of rocky land. Most of the acreage of the Rockland types is in a cutover forest, chiefly cedar with a few upland hardwoods. These areas are poorly suited to either crops or pasture. The Colbert soils are sparsely covered with cedar, brush, and a few weeds. They are not suited to crops and are poorly suited to pasture.

The prosperity of the individual farm in this association depends to a large extent on the acreage that the farm has of the Emory and Hermitage soils and the associated soils of the first bottoms. Where areas of these soils are small, the farms produce mainly for use of the farm family, and tobacco, the chief cash crop, is grown in small patches. Where areas of these soils are significantly larger, more grain and hay crops are grown. As a group, the soils are of low productivity. There are many part-time farmers.

Dandridge-Whitesburg-Hamblen Association (No. 8)

The Dandridge - Whitesburg - Hamblen association makes up about 4 percent of the county. Most of the acreage occurs in a narrow elongated area that crosses the entire county in a southwest-northeast direction. The area is dominantly steep and consists of soils that are shallow to calcareous shale bedrock. It is highly dissected by a well-defined pattern of dendritic drainage.

The Dandridge soils occupy practically all of the uplands, although there is a small acreage of Sequoia soils on spots of smoother relief. Leadvale and Muse soils are on the foot slopes and benches; Whitesburg soils are along the narrow intermittent drainways; and Staser, Hamblen, and Prader soils are on the first bottoms. The soils of the bottom lands and foot slopes make up a small part of the entire acreage, but they are highly important in the agriculture of the area because most of the suitable cropland consists of these soils.

About 70 percent of the area has been cleared. The rest is in cutover forest, chiefly mixed deciduous trees. A subsistence or small general type of farming is practiced in this association. The uplands are used chiefly for pasture, largely unimproved. A small acreage of corn, small grains, and other crops is grown on some of the smoother parts of the uplands. Most of the crops are grown on the local alluvial-colluvial soils and the narrow bottom-land strips. Tobacco is the most important cash crop.

Because they are steep, shallow, and droughty, most of the upland soils are poorly suited to crops. Most of the small area of bottom-land soils is well suited to intensive crop production, but some of the soils have imperfect drainage and are susceptible to flooding. The upland soils grow pasture in spring when the moisture supply is adequate, but they do not produce well during the drier summer months.

Bland Association (No. 9)

The Bland association covers only about 1 percent of the county. It occurs as a narrow elongated belt running parallel with Chilhowee Mountain. It is an area of steep ridges and consists mainly of soils that are shallow to shaly limestone bedrock. The soils are purplish or pinkish. They have developed over the Bays geologic formation, a calcareous mudstone.

The shallow Bland soils occupy practically all of the uplands. The narrow strips along drainways are mainly Neubert and Alcoa soils. The acreage of the local alluvial-colluvial soils is very small in this association, and the acreage of bottom lands is insignificant.

Most of the area is in a cutover forest of mixed deciduous trees with which some redcedar is intermingled. The small acreage of cleared land is either idle or used for unimproved pasture. The small acreage of crops that is grown is along the narrow drainways and foot slopes. Tobacco is the chief crop grown for sale. Corn, vegetables, and other crops are grown for home use.

Because of the steep slopes and shallow depth to bedrock, the upland soils of this association are poorly suited to crops and not very well suited to pasture. Forestry is probably their most suitable use. The soils along the drainways and on the foot slopes are well suited to the common crops, but the acreage of these soils on any one farm is very small—normally just enough for the garden crops and a tobacco patch.

Jefferson-Montevallo Association (No. 10)

The Jefferson-Montevallo association covers about 1 percent of the county. The eight separate areas occur along the foothills of the mountains or in mountain coves. This association is dominantly hilly, although it ranges from rolling to steep. Most of the soils are on colluvium that fell or was washed from the adjacent sandstone and quartzite mountain slopes.

Jefferson soils occur on most of the colluvium. In places where the colluvium is thin or lacking, the soils are mainly Montevallo. They are shallow over acid shale. The Montevallo and Jefferson soils occur in an intricate pattern throughout the association. This pattern depends on the amount of colluvium that overlies the acid shale. The steeper slopes are ordinarily Montevallo soils; the smoother parts are the Jefferson soils. Barbourville soils occur along the narrow intermittent drainways, and Staser, Hamblen, and Prader soils are on the first bottoms. The Hamblen soils probably occupy most of the bottom lands.

About one-half the acreage of this association has been cleared. The rest is in a cutover forest consisting

of mixed hardwoods and pines. A large part of the cleared acreage is used for unimproved pasture; some is idle. Only a small acreage is in crops, chiefly corn, tobacco, and garden crops. The crops are grown mainly on the more nearly level parts of the Jefferson soils and on the narrow bottom-land strips.

Individual farms in this association have a very small acreage of suitable cropland. Because the soils are steep, shallow, or stony, they are poorly suited to crops. The fertility of all the upland soils is very low. The small acreage of bottom-land soils is well suited to intensive use, but practically all of these soils are subject to flooding, and some small spots are poorly drained.

Lehew Association (No. 11)

The Lehew association covers only about 1 percent of the county. It consists of very narrow belts of very steep ridges that have very narrow crests. These ridges extend in a southwest-northeast direction from the vicinity of Rockford into Knox County. They are known locally as Bays Mountains. The soils are very shallow to bedrock, except in small areas where colluvium has been washed or sloughed from the ridges and carried in the drainways to the base of the steep slopes.

The only Lehew soil in the county occupies practically all of the steep slopes in this association. Soils on foot slopes and in drainways make up an insignificant acreage. The area as a whole has extremely low fertility, and it is not very productive, even of trees.

Practically all of the acreage is now under mixed deciduous and pine forest. The forest has been cut over many times, and the present stand is thin and of low quality. Much of the very small acreage of colluvial soils is cleared and used for crops and pasture. A very small part of the less steep parts of the Lehew soils is also cleared and is used for these purposes. Practically all of the association is included in farms that use the adjacent associations for cultivation. Because of the steep slopes and shallow depth to bedrock, the Lehew soils are mainly suited to forest.

Allen-Hayter Association (No. 12)

The Allen-Hayter association covers about 3 percent of the county. It consists of three separate areas that contain the major mountain coves of the county, Tuckaleechee, Cades, and Millers Coves. Although the association is dominantly rolling and hilly, it has a significant acreage of gently sloping land and isolated areas of steep land.

The area consists largely of old colluvium on which the Allen and Hayter soils are dominant. Other less extensive soils on the colluvial slopes are the Muse and Jefferson. Narrow strips of Barbourville soils are along the drainways. The Staser, Hamblen, Prader, Sequatchie, and Whitwell soils occupy a notable acreage of bottom lands and low terraces. The residual soils are mainly the Dunmore.

Since the association consists of colluvium deposited over several different types of residual materials, a rather wide range of soils and land conditions exist. Where the colluvial materials are thin or lacking, there are residual soils such as the Dunmore, Dandridge, or Teas. Nearby, where the colluvial deposits are thicker, such soils as Allen, Hayter, Jefferson, or Muse normally occur. A small part of the association has cobbles and stones that interfere with cultivation.

About 80 percent of the association has been cleared. Most of the less tillable areas are still in cutover forest; the cleared areas are used for the common crops of the county. General livestock farming, supplemented by small acreages of truck crops and tobacco, is commonly practiced. Part-time farming is common throughout the area. All the common crops can be successfully grown. The average farm is small—50 to 60 acres— but it contains much suitable crop and pastureland. The area seems well suited to general livestock farming.

Ramsey Association (No. 13)

The Ramsey association covers about 38 percent of the county. It is a steep, rugged mountainous area that has little or no potential for agriculture, except for forestry. The parent rock is mixed sandstone, quartzite, and slate. The soil material is generally thin over the bedrock, and bedrock outcrops and loose rock fragments are abundant. Nearly all of the association is under mixed deciduous and pine forest. A large part of the area is within the Great Smoky Mountains National Park.

The Ramsey soils occupy practically all the acreage of this association. Very small acreages of Jefferson, Allan, and Muse soils occur at the base of some of the steep slopes, and narrow strips of Barbourville soils occur along some of the drainways.

Genesis, Classification, and Morphology

Soil is the product of the forces of weathering and soil development acting on the parent soil material that was deposited or accumulated by geologic forces. The characteristics of the soil at any given point depend on (1) the physical and mineralogical composition of the parent material; (2) the climate under which the material has accumulated and existed since accumulation; (3) the plant and animal life in and on the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of development have acted on the soil material (*10*). Climate and vegetation are more important than the other factors in the development of the common properties of the soils of Blount County. The effects of age, relief, and parent materials vary widely within the county and largely account for the local differences among the soils.

Climate and vegetation are the active factors in soil genesis. They act on the parent material accumulated through the weathering of rocks and slowly change it into a body with genetically related horizons. The effects of climate and vegetation are conditioned by re-

lief. Relief is important in determining the drainage of the soil, the rate of natural erosion, and the kind of vegetation that grows on the soil. The parent material also affects the kind of profile that is formed and, in extreme cases, dominates it entirely. Finally, time is needed for the changing of the parent material into a soil profile. The time needed for a soil to develop horizons may be relatively long or very short, but some time is always required. A long interval of time generally is required for the development of distinct horizons.

The interrelations among the factors of soil formation are complex, and it is difficult to isolate the effects of any one with certainty. It is possible to find some areas where four of the factors are constant, or nearly so, and in these areas, the effects of the fifth factor can be partly evaluated. But even in these places, the measurements of the effects of the one factor are only approximations of the actual effects. Although it is convenient to discuss the individual factors and their effects in soil formation, the soil profile is not determined by a simple summation of the effects of these factors. It is determined by the integrated influence of all these factors.

The purpose of this section is to present the outstanding morphological characteristics of the soils of Blount County and to relate them to the factors of soil formation. The first part of the section deals with the environment under which the soils exist; the second with the specific soil series and the part environment has played in determining their morphology.

Factors of Soil Formation in Blount County

Parent material

The parent materials of the soils of Blount County may be considered in two broad classes: (1) Materials developed in place from the underlying rocks; and (2) materials transported by water or gravity, or both, and laid down as unconsolidated deposits of sand, silt, clay, and rock fragments. Materials developed in place are related directly to the underlying rocks from which they were derived. Transported materials are related to the soils or rocks from which they were carried.

The parent materials formed in place consist of the residuum weathered from sedimentary and metamorphic rocks. The properties of these rocks are strongly reflected in many of the properties of the soils that have developed from them. The sedimentary rocks include limestone, dolomitic limestone, sandstone, shale, and conglomerate. The metamorphic rocks include slate and quartzite. Geologically, the rocks are very old. They belong to the lower Paleozoic Age, mainly Cambrian and lower Ordovician. The rocks have been subjected to intense earth movements in the geologic past and are so closely folded and faulted that many beds are now inclined at high angles and some are actually overturned. In many places, the soils were derived from the edges of the rocks rather than from their flat surfaces. Soils that developed from the edges of rocks have highly variable properties.

The characteristics of soils developed in place generally show a relationship to their parent rock. This relationship also exists among soils consisting of alluvium, but it is less obvious because the alluvial deposits are mostly mixtures of materials from many parent rocks.

Climate

Blount County has a humid temperate climate. Summers are cooler in the mountain region than they are in the Great Valley section, and the average temperature is lower. Precipitation is also heavier and includes more snow.

The high rainfall throughout the county favors rather intense leaching of soluble and colloidal materials downward in the soil. Because the soil is frozen for only very short periods and to only very shallow depths, weathering and translocation of materials continue almost uninterruptedly. The lower temperatures in the mountainous areas retard chemical reactions in the soils, which are frozen for longer periods than in the valleys and to greater depths. Leaching is retarded by freezing. This effect of freezing is reflected by the slightly browner color of some of the mountain soils.

In Blount County climatic differences are not great enough to account for the broad differences that exist among the soils. Differences in relief, parent material, and age have been more important than differences in climate in causing local soil differences. The climate over the larger part of the county has characteristics of the climates of both the Red-Yellow Podzolic and Gray-Brown Podzolic soil regions. In parts of the county the Red-Yellow Podzolic and Gray-Brown Podzolic soils are intimately associated.

Plant and animal life

Mineral soil contains many kinds of living organisms, both animal and plant. The range of animal life in the soil is from the larger rodents, worms, and insects to the tiniest bacteria. The larger plants, such as trees, shrubs, and grasses, play an important part in soil development through the nutrient cycle; they influence the base status and the leaching losses of the soils. Pure pine forests tend to increase soil acidity and the rate of podzolization, whereas hardwood forests tend to retard podzolization.

A yellow pine-hardwood forest was on most of the soils in the Great Valley portion of the county, though locally there may have been almost pure stands of hardwoods. A spruce-fir forest predominates in the mountainous section at 4,000 feet or more above sea level. In the cove areas of the mountains, a white pine-hemlock-yellow poplar forest existed.

Differences probably existed in the density of forest stands, the relative proportion of the species, and the associated ground cover. The area as a whole, however, appears to have had a relatively uniform forest except in areas at the highest elevations in the mountains. It is doubtful that any of the marked differences in properties among the well-drained, well-developed soils are the direct result of differences in vegetation.

Most of the trees that grow in this area are deep feeders on plant nutrients. They are dominantly decid-

uous trees. The content of the various plant nutrients in the leaves of different species varies considerably, but leaves from deciduous trees generally contain more bases than do the needles from coniferous trees. When the trees shed their leaves, essential plant nutrients are returned to the upper part of the soil from the lower part. In this way, the depleting effects of percolating waters are counteracted.

Plants are the source of the organic matter that accumulates in the upper part of the soil. This material decomposes as it is acted on by micro-organisms, earthworms, and other life, and as chemical reactions occur. The organic material releases organic acids that hasten the dissolving of soluble constituents and the leaching and translocation of inorganic materials. The intensity of change resulting from this action is conditioned, however, by the climate, which affects the kinds of vegetation, the kinds of micro-organisms, and the rates of percolation and leaching. In Blount County, the plant materials decompose rather rapidly because of favorable temperature and moisture, favorable character of the organic material itself, and presumably favorable micropopulation of the soil. Organic matter decomposes more slowly in the higher altitudes than in the lower; as a result, soils on the higher mountains generally accumulate slightly more organic matter than those in the valleys.

Relief

Relief modifies the effects of climate and vegetation. In this county, relief ranges from nearly level on first bottoms to very steep in the mountainous region. On many steep slopes, runoff is rapid and the soil and weathered rock are eroded almost as fast as they are formed. The material for soil formation is constantly being removed from the steep slopes by water and gravity or by local slides. A profile of genetically related horizons generally is not formed on these steeper areas because the soil material seldom remains in place long enough. Only small quantities of water percolate through the soil on steep slopes, and there is little leaching and translocation of inorganic materials downward in the soil.

Age

The soils of Blount County range from very young to old. Their profiles range from immature to mature. The age of a soil is the length of time the forces of development have acted on the parent material. Soil material develops into a soil that is in an approximate state of equilibrium with its environment, if it remains in place for a long time under favorable conditions of relief and other factors of soil genesis. A soil having this equilibrium is a mature or old soil. The material of young soils has been in place for a short time and has been little altered by climate and vegetation; a well-defined soil profile or genetically related horizons has not formed. Most of the soils on the first bottoms along streams consist of recent deposits and are young; they have undeveloped profiles. Soils on steep slopes are replenished through the weathering of rock as their cover is removed by geologic erosion, and there is little opportunity for the formation of a genetic profile.

Classification and Morphology

The soils of the county are classified in three soil orders: Zonal, azonal, and intrazonal. In areas where the parent materials have been in place a long time and have not been subject to extreme conditions of relief or of the parent material itself, the soils have the characteristics of zonal soils. Zonal soils are members of one of the classes of the highest category in soils classification and are defined as those great soil groups of soils having well-developed soil characteristics that reflect the influence of the active factors of soil genesis—climate and living organisms (*10*).

The well-drained, well-developed soils in the county have been formed under relatively similar conditions of climate and vegetation and are zonal soils. It is on these soils that climate and vegetation have had maximum influence, and relief and age the least. As a result, these soils have many properties in common, although they were derived from various kinds of parent materials.

All of the undisturbed well-drained, well-developed soils have on the surface a layer of organic debris in various stages of decomposition. All have a dark-colored A_1 horizon. The A_2 horizon is lighter colored than either the A_1 or the B, because this layer is the zone of maximum leaching. The B horizon generally is uniformly colored yellow, brown, or red and is finer textured than the A horizon. The B horizon is the zone of maximum accumulation in the soil profile. The C horizon is variable in color and texture among the different soils, but it is normally variegated red, yellow, gray, and brown.

In areas where the parent materials have been in place only a short time, such as those recently transported, the soils have weakly defined or no genetic horizons. These soils are young and have few or none of the properties of zonal soils and are therefore called azonal soils. Azonal soils are members of a second class of the highest category of soil classification and are defined as a group of soils that do not have well-developed soil characteristics, because their youth, their parent material, or their relief prevents normal profile development (*10*).

These azonal soils have an A_1 horizon that is normally dark colored and contains a fairly high amount of organic matter. There is a slight or no layer of illuviation, or B horizon. The A horizon normally directly overlies the C horizon. These soils may be called A-C soils because of the absence of a B horizon. In Blount County the azonal soils occur mainly on the first bottoms and on the steep slopes where geologic erosion has closely followed soil formation.

On some nearly level areas where both internal and external drainage are restricted, soils whose materials have been in place a long time have certain well-developed profile characteristics that zonal soils do not have. Such soils are associated geographically with zonal soils and are called intrazonal soils. They are defined as soils with more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief or parent material or age over the normal effects of climate and vegetation (*10*). The

properties of such soils in this county are generally the result of level relief or age influenced greatly by the parent material.

In table 28 the soil series of Blount County are classified by order and great soil group, and some of the factors that have contributed to differences in soil morphology are given. This table will make the genetic relationships of the soils of the area easier to understand. In the following pages, the great soil groups of the county are discussed and the soil series in each group are described.

Zonal soils

The zonal soils of Blount County are subdivided into Red-Yellow Podzolic, Reddish-Brown Lateritic, and Gray-Brown Podzolic great soil groups.

RED-YELLOW PODZOLIC SOILS

Members of the Red-Yellow Podzolic great soil group are zonal soils having thin organic (A_0) and organic-mineral (A_1) layers over a yellowish-brown to brown leached layer that is underlain by an illuvial red horizon. They have developed under a dominantly deciduous forest in a warm-temperate moist climate. The soil-forming processes of their development are laterization and podzolization.

These soils have developed under similar climate and vegetation. They are well drained, but not excessively drained. All are old enough to have well developed soil horizons. Many profile differences can be correlated with marked differences in parent material.

DEWEY SERIES.—The Dewey series consists of well-drained, deep upland soils that have developed from

TABLE 28.—*Classification of the soil series into higher categories and their relief, parent material, and degree of horizon differentiation*[1]

ZONAL

Great soil groups and series[2]	Relief	Parent material	Degree of horizon differentiation[3]
Red-Yellow Podzolic soils:			
		Residuum from the weathering of—	
Dewey	Undulating to hilly	High-grade dolomitic limestone	High.
Fullerton	Undulating to hilly	Relatively low-grade dolomitic limestone	High.
Dunmore	Undulating to steep	Clayey dolomitic limestone	Very high.
Talbott	Undulating to hilly	Clayey limestone	High.
Sequoia	Undulating to rolling	Acid shales with thin lenses of limestone or calcareous shale.	High.
Christian	Undulating to hilly	Sandy shales or shaly sandstones	High.
		Alluvium from—	
Etowah	Undulating to rolling	Limestone material	Medium to low.
		Mixed alluvium from—	
Waynesboro	Undulating to hilly	Sandstone, quartzite, and shale; some limestone in places.	High.
Holston	Undulating to hilly	Chiefly sandstone and shale	High.
Allen	Undulating to hilly	Colluvium or local alluvium from sandstone, quartzite, and slate; some limestone in places.	High.
		Colluvium or local alluvium from—	
Jefferson	Undulating to hilly	Sandstone and quartzite	Medium to high.
Hermitage	Undulating to rolling	High-grade limestone	Medium to low.
Minvale	Undulating to rolling	Relatively siliceous limestone	Medium to low.
Pace	Undulating to rolling	Relatively siliceous limestone	Medium.
Muse	Undulating to hilly	Slates and shales	Medium.
Leadvale[4]	Undulating to rolling	Slates and shales	Medium to high.
Reddish-Brown Lateritic soils:			
		Residuum from the weathering of—	
Decatur	Undulating to hilly	High-grade dolomitic limestone	High.
Tellico	Rolling to very steep	Calcareous sandstone and sandy shales	Medium.
Farragut	Undulating to hilly	Limestone containing thin lenses of shale	High.
		Alluvium from—	
Cumberland	Undulating to hilly	Limestone material	Medium to high.
		Colluvium or local alluvium from—	
Alcoa	Undulating to hilly	Calcareous sandstone	Medium.
Gray-Brown Podzolic soils:			
		Colluvium or local alluvium from—	
Hayter	Undulating to rolling	Sandstone, quartzite, slate; some limestone in places.	Medium to low.
		Mixed alluvium mainly from—	
Sequatchie	Nearly level to undulating	Sandstone, quartzite, slate, and shale; some limestone in places.	Medium to low.

INTRAZONAL

Planosols:			
		Mixed alluvium mainly from—	
Whitwell	Nearly level	Sandstone, quartzite, slate, and shale; some limestone in places.	Medium to low.

See footnotes at end of table.

TABLE 28.—*Classification of the soil series into higher categories and their relief, parent material, and degree of horizon differentiation*[1]—Continued

AZONAL

Great soil groups and series[2]	Relief	Parent material	Degree of horizon differentiation[3]
Lithosols:			
		Residuum from the weathering of—	
Dandridge	Rolling to very steep	Calcareous shale	Low.
Litz	Rolling to very steep	Acid shale interbedded with lenses of calcareous shale or limestone.	Low.
Montevallo	Rolling to very steep	Acid shale	Low.
Teas	Rolling to steep	Interbedded dominantly acid shale and sandstone that has some thin calcareous lenses.	Low.
Ramsey	Rolling to very steep	Quartzite, sandstone, and slate	Low.
Colbert[5]	Rolling to steep	Clayey limestone	Low to medium.
Lehew	Rolling to very steep	Interbedded acid shale and acid sandstone	Low.
Bland	Rolling to steep	Red calcareous mudstone	Low.
Alluvial soils:			
		Alluvium from—	
Bruno	Nearly level	Sandstone and quartzite	Very low.
		Mixed alluvium from—	
Staser	Nearly level	Sandstone, quartzite, shale, and slate; some limestone in places.	Very low.
Hamblen	Nearly level	Sandstone, quartzite, shale, and slate; some limestone in places.	Very low.
Prader[6]	Nearly level	Sandstone, quartzite, shale, and slate; some limestone in places.	Very low.
Lindside	Nearly level	Limestone material	Very low.
Melvin[6]	Nearly level	Dolomitic limestone material	Very low.
		Colluvium or local alluvium from—	
Neubert	Undulating	Calcareous sandstone	Low to very low.
Emory	Undulating	High-grade dolomitic limestone	Low to very low.
Greendale	Undulating	Cherty or other low-grade limestone	Low to very low.
Whitesburg	Undulating	Calcareous shale	Low to very low.
Barbourville	Undulating	Quartzite, sandstone, shale, and slate	Low to very low.

[1] Inasmuch as climate and vegetation are relatively uniform, they do not account for the broad differences in the soils.

[2] For a discussion of the natural classification, description of the higher categories, and genesis of series see 1938 Yearbook of Agriculture (*10*) and Soil Science, February 1949 (*8*).

[3] The degree of horizon differentiation is a measure of age, an important factor in contributing to the local differences in soils.

[4] Some Leadvale soils approach the Planosol group in characteristics.

[5] May be considered also as Red-Yellow Podzolic.

[6] Characterized by a gley layer.

relatively high-grade dolomitic limestone. They have a brown surface soil and a red subsoil. The landscape is typically undulating to hilly with short moderately steep slopes and broad undulating and rolling tops. Sinkholes or depressions are common in some places, and a karst or hummocky topography is a result of many subterranean streams. The Dewey soils are closely related to the Decatur, Dunmore, and Fullerton soils and are intermingled with these soils in many places. The Dewey series is an intergrade between the Dunmore and Fullerton soils on the one hand and the Decatur soils on the other. They differ from the Decatur soils mainly in being lighter colored throughout the profile. They differ from the Dunmore and Fullerton in being darker colored and in containing less chert. The depth to bedrock is less than 5 feet in only a few places. The average depth is between 8 and 10 feet. Depth to bedrock, however, varies several feet within short distances.

The following describes a profile of Dewey silt loam:

A_1 0 to 1 inch, very dark brown (10YR 2/2) very friable silt loam; weak fine crumb structure.

A_2 1 to 7 inches, brown (7.5YR 4/4) very friable silt loam; moderate medium granular structure.

B_1 7 to 11 inches, yellowish-red (5YR 4/6) friable silty clay loam; moderate to strong fine subangular blocky structure.

B_{21} 11 to 17 inches, red (2.5YR 4/8) firm silty clay; moderate to strong medium subangular blocky structure.

B_{22} 17 to 44 inches, red (10R 4/6) firm silty clay or clay; strong medium subangular blocky structure.

B_3 44 to 60 inches, red (2.5YR 4/8) or yellowish-red (5YR 4/8) firm clay or silty clay; structure is less distinct than in layer above and individual aggregates are larger; few, fine, prominent yellowish-brown splotchings or streaks that are more numerous in lower part; a few finely divided chert fragments in some places.

FULLERTON SERIES.—The Fullerton series consists of deep, well-drained, cherty soils of the uplands. These soils have a light-colored surface soil and a red subsoil. They have developed from materials weathered from low-grade or cherty dolomitic limestone. These soils commonly occupy higher positions than do their associated Dewey and Decatur soils, and they are lighter colored, deeper to bedrock, and less fertile. Furthermore, they have steeper slopes and more insoluble parent material. Fullerton soils are also associated with the Dunmore soils. They differ from the Dunmore soils in being deeper to bedrock, more cherty, and in having

thicker soil horizons. They are slightly less plastic and clayey and apparently are less productive.

The following describes a profile of Fullerton cherty silt loam:

- A_1 0 to 2 inches, grayish-brown (10YR 4/2) or dark grayish-brown (10YR 5/2) very friable cherty silt loam; moderate fine crumb structure; most chert fragments less than 1½ inches in diameter.
- A_2 2 to 8 inches, light yellowish-brown (10YR 6/4) very friable cherty silt loam; moderate fine granular structure.
- A_3 8 to 14 inches, yellowish-brown (10YR 5/6) friable silt loam; moderate fine blocky structure.
- B_1 14 to 20 inches, strong-brown (7.5YR 5/6) or yellowish-red (5YR 5/6) friable cherty silty clay loam; moderate fine subangular blocky structure.
- B_2 20 to 43 inches, red (2.5YR 4/6) or yellowish-red (5YR 4/6) moderately firm silty clay loam; moderate medium subangular blocky structure.
- B_3 or C 43 to 60 inches +, red (2.5YR 4/8) or yellowish-red (5YR 4/8) silty clay with few, fine, distinct brownish-yellow (10YR 6/6) mottles; moderately firm; moderate medium blocky structure; many chert fragments as much as 2 inches in diameter; depth to bedrock generally more than 10 feet.

DUNMORE SERIES.—The Dunmore series consists of deep, well-drained soils on limestone uplands. These soils have a light-colored surface soil and a yellowish-red firm subsoil. They have developed in the residuum of clayey dolomitic limestone that contains thin lenses of shale in some places. The topography is dominantly undulating to hilly; slopes are short and moderately steep and the tops of the hills are broad and undulating to rolling. Many areas do not have well-defined drainage patterns. A karst or hummocky topography is a result of many sinks or depressions.

Dunmore soils are associated with the Dewey and Fullerton soils. They differ from the Dewey soils in being lighter in color throughout the profile and somewhat less productive. They differ from the Fullerton soils in being more firm or plastic, thinner in the B horizon, and in having no or a thinner transition layer between the A and B horizons. They are generally shallower over bedrock and contain less chert than the Fullerton soils and are not so strongly leached. The parent material of Dunmore soils is apparently low in silica or other insoluble impurities.

The following describes a profile of Dunmore silt loam:

- A_1 0 to 2 inches, grayish-brown or dark grayish-brown (10YR 5/2 to 4/2) very friable silt loam; weak medium crumb structure.
- A_2 2 to 9 inches, brown (10YR 5/3) or yellowish-brown (10YR 5/4) friable silt loam; moderate medium granular structure.
- B_1 9 to 13 inches, yellowish-red (5YR 5/8) firm silty clay; strong medium subangular blocky structure.
- B_{21} 13 to 25 inches, yellowish-red (5YR 5/8) very firm silty clay or clay; strong coarse subangular blocky structure.
- B_{22} 25 to 30 inches, yellowish-red (5YR 5/8) very firm silty clay or clay; few, fine, distinct brownish-yellow mottles; strong coarse subangular blocky structure.
- B_3 or C 30 to 50 inches +, yellowish-red (5YR 5/8) very firm silty clay or clay; common, fine, distinct brownish-yellow mottles; moderate coarse subangular blocky structure; depth to bedrock is uneven but averages about 5 feet.

TALBOTT SERIES.—In this series are moderately deep soils of the limestone uplands. They have fine-textured B and C horizons that are characteristic of soils having parent materials derived from argillaceous limestone. They are shallower to bedrock than the Dunmore and Dewey soils. Their position, relief, and thickness suggest that the parent limestone weathers rapidly and leaves a relatively small amount of insoluble residue. These soils erode readily if cultivated and may have eroded rather rapidly under natural vegetation. This geologic erosion probably accounts in part for their moderate depth to bedrock. Deciduous forest, chiefly oak and hickory, was the prevailing native vegetation. Talbott soils are medium acid to strongly acid and moderately low in fertility.

The following describes a representative profile of Talbott silt loam:

- A_1 0 to 2 inches, dark-brown (7.5YR 3/2) friable silt loam; moderate fine granular structure.
- A_2 2 to 7 inches, brown (7.5YR 4/4) friable heavy silt loam; moderate medium granular structure.
- B_1 7 to 9 inches, yellowish-red (5YR 4/8) mixed with brown (7.5YR 4/4) moderately friable silty clay loam; moderate fine blocky structure.
- B_2 9 to 24 inches, yellowish-red (5YR 4/6) very firm clay; very plastic when wet and extremely hard when dry; strong coarse subangular blocky structure; thick continuous clay skins on both vertical and horizontal structural faces.
- C 24 inches +, yellowish-red (5YR 5/8) very firm clay with common, fine, distinct light yellowish-brown splotches; strong coarse subangular blocky structure; argillaceous limestone bedrock generally occurs at depths of 2½ to 5 feet but is at shallow depths in some places and outcrops in others.

SEQUOIA SERIES.—The Sequoia soils have developed from the weathered products of shale. The shale bedrock was originally calcareous, but it is now leached to a depth of several feet. In places thin seams of limestone are interbedded with the shale. The parent material of the Sequoia soils is similar to that of the Litz soils. Differences between the soils of these two series are chiefly a result of differences in relief. The Sequoia soils occupy milder relief than do the shallow Litz soils and therefore are subject to a slower rate of geologic erosion. As a result, they have developed a zonal profile, whereas the Litz soils have an azonal profile.

The Sequoia soils are shallower to bedrock than the Dewey and Decatur soils but have relatively strong textural and structural profile characteristics. The illuviated layer of the Sequoia soils has a decidedly finer texture and a strong blocky structure in contrast to the silt loam texture and granular structure of the eluviated layer. The Sequoia soils are well drained, low in natural fertility, and strongly acid.

The following describes a representative profile:

- A_1 0 to 2 inches, dark grayish-brown (10YR 4/2) very friable silt loam; weak to moderate medium crumb structure.
- A_2 2 to 8 inches, yellowish-brown (10YR 5/4) friable silt loam; moderate medium granular structure.
- B_1 8 to 12 inches, strong-brown (7.5YR 5/8) firm silty clay; plastic when wet; moderate medium subangular blocky structure.
- B_2 12 to 32 inches, yellowish-red (5YR 5/8) firm to very firm silty clay; plastic when wet; strong coarse subangular blocky structure.

C 32 to 42 inches, yellowish-red (5YR 5/8) firm silty clay loam mixed with many soft or leached shale fragments that make up about 40 percent of the total mass; layer overlies leached shale bedrock.

CHRISTIAN SERIES.—The Christian series consists of well-drained soils that developed from sandy shales. In places thin seams of calcareous sandstone and limestone are interbedded with the shales. In some places the bedrock is calcareous sandstone. These soils are generally 2½ to 5 feet deep to bedrock.

Christian soils are associated with the Tellico, Litz, and Sequoia soils. They differ from the Tellico soils chiefly in being lighter colored throughout the profile, especially in the upper part, and in being shallower to bedrock. The differences between the soils of these two series are apparently largely the result of differences in parent material. The parent material of the Christian soils is probably lower in bases and less soluble than that of the Tellico soils. The parent material also had an influence on the quality and density of the forest stands that grew on the two soils. Christian soils are low in fertility and strongly acid.

The following describes a profile of Christian loam:

A_1 0 to 1 inch, dark grayish-brown (10YR 4/2) very friable loam; weak fine granular structure.

A_2 1 to 8 inches, yellowish-brown (10YR 5/4) to brown (10YR 5/3.5) very friable loam; moderate fine granular structure.

A_3 8 to 12 inches, strong-brown (7.5YR 5/6) or yellowish-brown (10YR 5/6) (strong brown when crushed) friable loam; moderate medium granular structure.

B_1 12 to 16 inches, strong-brown (7.5YR 5/6) friable loam or light clay loam; moderate fine blocky structure.

B_{21} 16 to 26 inches, yellowish-red (5YR 5/8) friable clay loam; moderate fine blocky structure.

B_{22} 26 to 42 inches, red (2.5YR 4/8) moderately friable clay loam; moderate medium subangular blocky structure.

C 42 inches +, red (2.5YR 4/8) moderately friable clay loam; few, fine, prominent brownish-yellow mottles that increase in size and abundance with increasing depth; layer continues to sandy shale or shaly sandstone bedrock.

ETOWAH SERIES.—This series is placed in the Red-Yellow Podzolic great soil group, but it is actually an intergrade between the Red-Yellow Podzolic and the Reddish-Brown Lateritic groups. It consists of deep, well-drained soils of the terrace lands. These soils have a brown surface soil and a red subsoil. They have developed in alluvial deposits that have been washed mainly from the Decatur, Dewey, and other upland soils that were derived from high-grade limestone. Etowah soils are intermediate between the soils of the low and the soils of the high terraces, both in position and in degree of profile development. Typical areas occur immediately below the Cumberland soils. Etowah soils differ from the Cumberland soils in being lighter colored throughout the profile and in having less distinct horizons. They are especially less red in the B horizon.

The following describes a profile of Etowah silt loam:

A_1 0 to 8 inches, dark-brown (7.5YR 4/4) very friable silt loam; moderate fine granular structure.

B_1 8 to 21 inches, reddish-brown (5YR 4/4) or yellowish-red (5YR 4/6) friable silty clay loam; moderate fine blocky structure; a few streaks of dark brown extend down from the layer above.

B_2 21 to 45 inches, red (2.5YR 4/6) or yellowish-red (5YR 4/6) moderately friable silty clay loam; moderate fine blocky structure; a few black specks and stains.

B_3 or C 45 inches +, red (2.5YR 4/6) friable silty clay loam; moderate medium subangular blocky structure; few, fine, distinct brownish-yellow splotches.

WAYNESBORO SERIES.—Like the Dewey and Etowah series, the Waynesboro series is an intergrade between Red-Yellow Podzolic and Reddish-Brown Lateritic great soil groups. The series consists of deep, well-drained soils on high stream terraces. The alluvial material of these soils is a mixture derived from sandstone, quartzite, and shale, but in most places it contains a notable amount of limestone material. The B horizon of the Waynesboro soils is not so fine textured and is less firm than that of red podzolic soils that have developed in limestone residuum. The strong eluviation of the profile is partly the result of the Waynesboro substratum being pervious to water. The parent material is lower in bases than that of limestone origin. Waynesboro soils are medium in natural fertility and strongly acid.

The following describes a representative profile of Waynesboro loam:

A_1 0 to 1 inch, dark-brown (7.5YR 3/2) very friable loam; weak medium crumb structure.

A_2 1 to 8 inches, brown (7.5YR 5/4) very friable loam; weak medium granular structure.

A_3 8 to 12 inches, reddish-yellow (7.5YR 6/8) friable light clay loam; moderate medium granular structure.

B_1 12 to 16 inches, red (2.5YR 4/6) friable clay loam; moderate fine subangular blocky structure.

B_2 16 to 44 inches, dark-red (2.5YR 3/6) friable clay loam to silty clay loam; moderate medium subangular blocky structure.

B_3 44 to 55 inches, red (2.5YR 4/6) friable clay loam; few, fine, distinct yellowish-brown variegations in lower part; moderate medium subangular blocky structure.

C 55 to 72 inches, red (2.5YR 4/6) to yellowish-red (5YR 4/6) friable clay loam to sandy clay loam streaked or splotched with yellow and brown.

HOLSTON SERIES.—The Holston soils have developed in old stream alluvium that was derived chiefly from sandstone, shale, and quartzite. Some material derived from limestone is intermixed in places. These soils are undulating to hilly. They have good external drainage and adequate but slightly restricted internal drainage. They appear to be very old and in some places have properties similar to those of the Planosols. They are normally deep to bedrock.

The Holston soils have developed from materials low in bases. This development and the slightly restricted internal drainage probably contributed to the yellow color of the B horizon, which differs from reddish color of the B horizon of the associated Waynesboro soils. Practically all areas of the Holston soils overlie shale

bedrock, whereas practically all areas of Waynesboro soils overlie limestone bedrock. Through its effect on internal drainage and probably its smaller effect upon base status, the bedrock apparently has greatly influenced the soil profile that developed in the overlying alluvium. Holston soils are strongly acid and low in organic matter and fertility.

The following describes a representative Holston profile:

- A_1 0 to 2 inches, grayish-brown (10YR 5/2) very friable fine sandy loam; contains some partly disintegrated organic matter.
- A_2 2 to 9 inches, light yellowish-brown (10YR 6/4) very friable fine sandy loam; weak medium crumb structure.
- B_1 9 to 12 inches, yellowish-brown (10YR 5/6) friable loam; moderate medium granular structure.
- B_2 12 to 32 inches, brownish-yellow (10YR 6/6) moderately friable clay loam; moderate medium subangular blocky structure; rounded sandstone or quartzite pebbles are common.
- B_3 or C 32 to 48 inches +, brownish-yellow (10YR 6/6) or yellow (10YR 7/6) moderately friable clay loam; common, fine, distinct light-gray mottles; moderate medium subangular blocky structure; structure less distinct than in layer above; alluvial deposit generally more than 3 feet thick.

ALLEN SERIES.—The soils of the Allen series are deep and well drained. They have developed in colluvial materials that rolled or were washed from soils underlain mainly by sandstone, quartzite, shale, and slate. In most places some limestone is included. These soils occupy mountain foot slopes where sediments of geologic erosion have accumulated. They have been in place long enough for the soil horizon to be strongly developed. They are typical red members of the Red-Yellow Podzolic great soil group.

These soils occur on a rolling to hilly topography and have formed under a mixed hardwood and pine forest. They differ from the associated Jefferson soils in having a red rather than a yellow subsoil. Allen soils are very permeable to air and water, fairly low in fertility, and strongly acid.

The following describes a representative profile of Allen fine sandy loam:

- A_1 0 to 1 inch, grayish-brown (10YR 5/2) very friable fine sandy loam; weak fine crumb structure.
- A_2 1 to 8 inches, pale-brown (10YR 6/3) very friable fine sandy loam; weak fine granular structure.
- A_3 8 to 12 inches, strong-brown (7.5YR 5/8) friable fine sandy or sandy clay loam; moderate fine subangular blocky structure.
- B_1 12 to 17 inches, yellowish-red (5YR 5/8) friable clay loam; moderate medium and fine subangular blocky structure.
- B_2 17 to 44 inches, red (2.5YR 4/6) friable clay loam; moderate medium subangular blocky structure.
- C 44 to 60 inches, red (2.5YR 4/8) friable clay loam, sandy clay, or sandy clay loam; variegated or splotched with yellow and brown.

JEFFERSON SERIES.—The soils of the Jefferson series occur on dominantly rolling to hilly foot slopes and benches at the base of mountain slopes. Their parent materials are local alluvium or colluvium that rolled or was washed chiefly from the Ramsey soils of the adjoining uplands. The materials were derived mainly from sandstone and quartzite and partly from slate. In most places these soils have developed under mixed pine and hardwood forest in a climate similar to that of the other zonal soils of the Ridge and Valley province.

Jefferson soils are similar to their associated Allen soils; they differ chiefly in having yellow rather than red subsoils. Practically all areas of Jefferson soils are underlain by shale or sandstone bedrock, whereas practically all areas of colluvium in which the Allen soils were formed are underlain by limestone bedrock. The bedrock underlying the colluvium apparently has had some effect on the profile that developed. Jefferson soils are very low in fertility, low in organic matter, and strongly acid.

Following is a representative profile of cultivated Jefferson fine sandy loam:

- A_p 0 to 7 inches, pale-brown (10YR 6/3) very friable fine sandy loam; weak medium crumb structure.
- A_3 7 to 14 inches, yellowish-brown (10YR 5/6) very friable fine sandy loam or loam; weak medium granular structure.
- B_2 14 to 36 inches, strong-brown (7.5YR 5/8) or reddish-yellow (5YR 5/8) friable clay loam or sandy clay loam; moderate fine and medium angular blocky structure.
- C 36 to 54 inches +, reddish-yellow (5YR 6/8) friable sandy clay loam; color ranges to yellowish red in places; moderate fine and medium angular blocky structure; practically all areas are underlain by shale or slate residuum at depths generally ranging from 3 to 10 feet.

HERMITAGE SERIES.—Like the Dewey and Etowah series, the Hermitage is an intergrade between the Red-Yellow Podzolic and the Reddish-Brown Lateritic great soil groups. The series consists of deep, well-drained soils. These soils have a brown friable surface soil and a red moderately friable subsoil. They have developed in local alluvium or colluvium that rolled or was washed from Decatur, Dewey, Cumberland, or other upland soils that were derived from high-grade limestone. They are similar to the Alcoa soils in position and degree of development but differ chiefly in being slightly finer textured throughout the profile. The difference between these two soils is chiefly the result of differences in parent material. The Hermitage soils differ from the closely associated Emory soils in being older and in having a moderately well developed profile. They have formed on undulating to rolling topography under a dense upland hardwood forest. Hermitage soils are relatively fertile and about medium acid.

The following describes a representative profile of Hermitage silt loam:

- A_1 0 to 8 inches, dark-brown (7.5YR 3/2) very friable silt loam; weak fine granular structure.
- B_1 8 to 19 inches, reddish-brown (5YR 4/4) friable light silty clay loam; weak fine blocky structure.
- B_2 19 to 39 inches, yellowish-red (5YR 4/6) to reddish-brown (5YR 4/4) friable silty clay loam; moderate fine blocky structure.
- B_3 39 to 54 inches +, yellowish-red (5YR 4/8) or red (2.5YR 4/8) friable silty clay loam; few, fine, distinct brownish-yellow mottles; moderate medium subangular blocky structure; a few black specks and stains.

MINVALE SERIES.—The Minvale soils are deep and well drained. They are typical of the Red-Yellow Podzolic group. They have developed in local alluvium or

colluvium that was derived from dolomitic limestone. The limestone materials are more siliceous than are the parent materials of the Hermitage soils. The differences between the Minvale and Hermitage soils are thought to be largely the result of differences in parent material. The Minvale soils are lighter colored throughout the profile than the Hermitage soils and commonly contain more siliceous material.

These soils occur on gently sloping to sloping foot slopes and benches immediately below the parent Dunmore and Fullerton soils. They have developed under a hardwood forest that consisted largely of oak and hickory. They are medium to low in fertility and strongly acid.

The Minvale soils are closely associated with the Pace and Greendale soils. They differ from the Pace soils in having a yellowish-red rather than a yellow subsoil. They differ from the young Greendale soils in being older and in having a moderately well developed profile.

The following describes a representative profile of Minvale silt loam:

A_2 0 to 6 inches, pale-brown (10YR 6/3) very friable silt loam; weak fine granular structure.

A_3 6 to 10 inches, yellowish-brown (10YR 5/6) or strong-brown (7.5YR 5/6) friable silt loam; moderate medium granular structure.

B_1 10 to 16 inches, strong-brown (7.5YR 5/8) friable light silty clay loam; moderate fine blocky structure.

B_2 16 to 34 inches, yellowish-red (5YR 5/8) friable silty clay loam; moderate medium subangular blocky structure.

C 34 to 52 inches +, yellowish-red (5YR 4/8) friable to slightly firm silty clay loam; few, fine, distinct brownish-yellow mottles; strong medium subangular blocky structure; practically all areas are underlain by limestone residuum at depths of 3 to 10 feet.

PACE SERIES.—The Pace series consists of well-drained soils that have developed in colluvium and local alluvium that rolled or was washed mainly from Dunmore and Fullerton soils, which were derived chiefly from limestone materials. They lie at the foot of slopes and on benches and fans where sediments of geologic erosion have accumulated. They are undulating to rolling and were formed under a hardwood forest. Probably because of the slight relief and the more than normal seepage, a weak pan occurs in many areas at a depth of about 24 inches.

Pace soils are similar to Minvale soils in parent material, degree of development, and physiographic position, but they are less well drained and have a yellowish rather than a reddish B horizon. Differences between soils of these two series appear to be a result of differences in relief and drainage. Pace soils are very low in fertility and organic matter and are strongly acid.

The following describes a representative profile of Pace silt loam:

A_2 0 to 8 inches, yellowish-brown (10YR 5/4) very friable silt loam; weak medium to fine granular structure.

B_2 8 to 12 inches, yellowish-brown (10YR 5/8) friable light silty clay loam; weak fine subangular blocky and moderate medium granular structure.

B_2 12 to 26 inches, brownish-yellow (10YR 6/6) to yellowish-brown (10YR 5/6) friable silty clay loam; weak medium subangular blocky structure.

B_{3m} 26 to 48 inches +, light yellowish-brown (2.5Y 6/4) silty clay loam; common, fine, distinct light brownish-gray (2.5Y 6/2) mottles; compact but friable when moist and hard when dry; moderate thick platy and medium subangular blocky structure; colluvium underlain by limestone residuum in practically all places at depths of 4 feet or more.

MUSE SERIES.—The Muse series consists of deep, well-drained soils that have developed in local alluvium and colluvium that rolled or was washed chiefly from uplands underlain by slates or shales. These soils ordinarily occur on foot slopes, benches, and fans below the upland slopes that have contributed their parent materials. The parent materials have been in place long enough for moderately strong horizons to develop.

These soils differ from the young Barbourville soils mainly in their degree of horizon development. They are similar to the Leadvale soils but have reddish rather than yellowish B horizons and are better drained. Muse soils have developed on undulating to hilly topography under a deciduous forest. They are strongly acid and moderately low in fertility.

The following describes a representative profile of cultivated Muse silt loam:

A_p 0 to 7 inches, yellowish-brown (10YR 5/4) very friable silt loam; moderate fine granular structure; in virgin areas, a 1- to 2-inch surface layer is stained dark with organic matter.

A_3 7 to 12 inches, brownish-yellow (10YR 6/6) friable silt loam; moderate fine and medium angular blocky structure.

B_2 12 to 30 inches, strong-brown (7.5YR 5/8) friable silty clay loam; moderate medium angular blocky structure.

C 30 to 48 inches +, strong-brown (7.5YR 5/8) friable silty clay loam; few, fine, distinct variegations; moderate medium angular blocky structure is less distinct than in layer above; colluvial deposit normally more than 3 feet thick.

LEADVALE SERIES.—The Leadvale soils have developed in moderately old to old colluvium that was derived chiefly from shale. They are well drained externally. Because of the slightly compact substratum and the tight-bedded shale bedrock, the movement of water and air is retarded and internal drainage is moderately slow.

Leadvale soils occur on gently sloping to sloping foot slopes, benches, and fans immediately below soils on upland slopes that were derived from shale. They have formed under a predominantly deciduous forest. Their profile is well developed. In places where the mottled horizon is compact, the Leadvale soils have some properties of intrazonal soils. Some areas seem to be gradational between the zonal Red-Yellow Podzolic soils and intrazonal soils.

Leadvale soils are strongly acid, low in organic matter, and low in fertility. They are similar to the Muse soils in age, parent material, and physiographic position but have yellow rather than reddish B horizons and are somewhat more poorly drained internally.

The following describes a representative profile of cultivated Leadvale silt loam:

A_p 0 to 8 inches, yellowish-brown (10YR 5/4) friable silt loam; moderate medium granular structure; in virgin areas the upper 1- to 2-inch layer is stained dark with organic matter.

B_1 8 to 15 inches, brownish-yellow (10YR 6/6) friable to firm silty clay loam; moderate fine angular blocky structure.

B_2 15 to 23 inches, brownish-yellow (10YR 6/8) firm silty clay loam; moderate medium subangular blocky structure.

B_3 23 to 48 inches +, brownish-yellow (10YR 6/6) firm silty clay; common, fine, distinct pale-yellow and gray mottles; structureless (massive) or weak coarse blocky structure; many black streaks and stains, and a few black concretions; practically all areas are underlain by shale residuum at depths of 3 feet or more.

REDDISH-BROWN LATERITIC SOILS

Members of the Reddish-Brown Lateritic great soil group are zonal soils that have dark reddish-brown granular surface soils, red friable clay B horizons, and red or reticulately mottled lateritic parent material. These soils have developed under a tropical forest in a humid tropical climate that has wet and dry seasons (*10*).

The soils in Blount County classed as members of the Reddish-Brown Lateritic great soil group do not fully qualify for this group. Apparently they did not develop in a humid tropical climate under tropical forest. The clay fraction is higher in silica than is characteristic of lateritic material, and the reaction is lower (pH 5.0 to 6.0). These soils are distinguished from the Red-Yellow Podzolic soils by having thicker A_1 layers, less distinct A_2 layers, stronger granular structure throughout the A layers, and, in general, a subsoil that is more uniformly red.

DECATUR SERIES.—The soils of the Decatur series have developed from high-grade limestone materials. They are deep over bedrock and have thick B_2 horizons. They are rolling to hilly and have many sinks and depressions. They are intricately associated with the Dewey soils and differ from them in being darker colored throughout the profile. Decatur soils have developed under a deciduous forest, chiefly oak, hickory, and poplar.

Decatur soils are placed in the Reddish-Brown Lateritic great soil group but they are not typical of the group. They lack the leached, eluviated A_2 horizon that is characteristic of Podzolic soils. This lack might be attributed to the parent materials, which are not so easily converted to Red-Yellow Podzolic soils as other parent materials. It might also be attributed to the luxuriant vegetation and the effect it has on the nutrient cycle by retarding the leaching of bases.

The following describes a typical Decatur profile:

A_{11} 0 to 2 inches, very dark grayish-brown (10YR 3/2) very friable silt loam; moderate medium crumb structure.

A_{12} 2 to 10 inches, drak-brown (7.5YR 3/2) to dark reddish-brown (5YR 3/3) friable silt loam; moderate to strong medium granular structure.

A_3 10 to 14 inches, dark reddish-brown (2.5YR 3/4) moderately friable silty clay loam; moderate fine subangular blocky structure.

B_1 14 to 20 inches, dark-red (2.5YR 3/6) firm silty clay or clay; moderate medium subangular blocky structure.

B_2 20 to 44 inches, dark-red (10R 3/6) firm silty clay or clay; very plastic when wet; strong medium subangular blocky structure.

B_3 44 to 65 inches, red (10R 4/6) to dark-red (10R 3/6) firm silty clay or clay; few, fine, prominent brownish-yellow variegations in lower part; strong medium subangular blocky structure; structural aggregates larger and less distinct than in layer above.

C 65 to 84 inches +, reddish-brown to yellowish-brown firm or plastic silty clay or clay that is variegated or streaked with yellow, brown, and red; bedrock at depths of 10 to 20 feet in most places.

TELLICO SERIES.—Tellico soils have developed in material that weathered from calcareous sandstone. Their subsoil has a striking red color and is notably friable and permeable. The A horizon is sandy and friable and slightly lighter colored than the surface layer of soils developed from limestone that have a similar red subsoil. Tellico landscapes are rugged, mainly hilly and steep. Although the modal profile is designated as zonal, some areas on the steeper slopes have either a Lithosol profile or a profile that is transitional between the Lithosols and the Red-Yellow Podzolic soils. The steep slopes and rapid geologic erosion probably account for these shallow variations.

In some places the bedrock is shaly calcareous sandstone or sandy shale. In some areas the soil contains little sand and the subsoil strongly resembles that of soils that were derived from high-grade limestone. Tellico soils are medium acid to strongly acid. They contain a moderate amount of organic matter and are moderately fertile.

The following describes a Tellico profile:

A_{11} 0 to 2 inches, very dark grayish-brown (10YR 3/2) very friable loam to fine sandy loam; contains much partly disintegrated organic matter.

A_{12} 2 to 8 inches, dark-brown (7.5YR 3/2) very friable loam; weak fine granular structure.

A_3 8 to 12 inches, mixed dark reddish-brown (5YR 3/3) and dark-red (2.5YR 3/6) friable light clay loam; weak fine subangular blocky structure.

B_1 12 to 16 inches, dark-red (2.5YR 3/6) friable clay loam; moderate fine and medium subangular blocky structure.

B_2 16 to 44 inches, dark-red (10R 3/6) friable clay loam or sandy clay; moderate medium subangular blocky structure.

C 44 inches +, red (2.5YR 4/6) faintly streaked with reddish-yellow (5YR 6/6) or yellowish-brown (10YR 5/6) friable sandy clay loam; yellow is more prominent with increasing depth; lower part has some weak-structured shaly fragments in places; bedrock occurs at 4 to 7 feet in the less strongly sloping parts.

FARRAGUT SERIES.—The Farragut series consists of deep, well-drained soils of the uplands. These soils have a dark-brown surface soil and a red subsoil. They have developed in residual materials that were weathered from limestone containing thin lenses of shale. The upper part of the solum resembles that of the Dewey and Decatur soils in color, texture, and consistence, but the solum is generally thinner and is underlain by a slightly shaly substratum. Farragut soils are most commonly associated with the Sequoia, Litz, and Talbott soils and with types of Rockland.

The following describes a profile of Farragut silty clay loam:

- A_1 0 to 2 inches, very dark grayish-brown (10YR 3/2) very friable silt loam.
- A_2 2 to 8 inches, reddish-brown (5YR 4/4) moderately friable silty clay loam; strong medium granular structure; in virgin areas, layer may be 8 to 10 inches thick.
- B_1 8 to 14 inches, reddish-brown (2.5YR 4/4) firm silty clay loam or silty clay; strong medium subangular blocky structure.
- B_2 14 to 28 inches, red (2.5YR 4/6) firm silty clay or clay; strong coarse and medium subangular blocky structure.
- B_3 or C 28 to 48 inches, red (2.5YR 4/6) firm silty clay or clay; moderate coarse subangular blocky structure; a few small, soft, well-leached, brownish-yellow shale fragments.

CUMBERLAND SERIES.—The Cumberland soils are red members of the Red-Yellow Podzolic great soil group. They have developed from very old deposits of mixed alluvium in which limestone material appears to be the major component. Some materials that originated from sandstone, quartzite, shale, and slate are intermixed. A dense forest seems to be the result of the relatively high fertility and favorable moisture. The upper layer of these soils contains a large amount of organic matter. The dense forest tended to maintain fertility by returning bases to the surface soil through the falling leaves.

The Cumberland soils resemble the Decatur soils, but they are generally more friable throughout their profile. The differences between the soils of these two series could possibly be a result of a difference in age. The Cumberland soils are medium acid to strongly acid throughout.

The following is a profile of Cumberland silty clay loam:

- A_{11} 0 to 2 inches, very dark grayish-brown (10YR 3/2) very friable silt loam; weak medium crumb structure.
- A_{12} 2 to 8 inches, reddish-brown (5YR 4/3) or dark-brown (7.5YR 3/2) friable silty clay loam; moderate medium granular structure; in virgin areas, upper 1 to 2 inches is stained dark with organic matter.
- B_1 8 to 14 inches, red (2.5YR 4/6) friable silty clay loam; moderate fine subangular blocky structure.
- B_2 14 to 44 inches, red (2.5YR 4/6) to dark-red (2.5YR 3/6) moderately friable silty clay or clay; moderate medium subangular blocky structure.
- B_3 44 to 60 inches, red (2.5YR 4/6) moderately friable silty clay loam; moderate medium subangular blocky structure; structure less distinct than in B_2 horizon; in some places layer is lightly streaked or splotched with yellow and gray in lower part.

ALCOA SERIES.—The Alcoa soils developed in colluvium or local alluvium that was washed chiefly from Tellico soils. The surface layer is dark and relatively high in organic matter, and the entire profile is permeable and well drained. These soils are undulating to hilly. They occur on foot slopes and benches immediately below the parent Tellico soils and above the young Neubert soils, which commonly lie along drainways. They differ from the Neubert soils in having a moderately well developed profile. Alcoa soils have formed under a dense upland hardwood forest that consisted largely of oak, hickory, and poplar. This vegetation has had a strong influence on the profile that developed. Alcoa soils are relatively fertile and medium acid to strongly acid.

The following describes a typical profile:

- A_1 0 to 10 inches, dark reddish-brown (5YR 3/3) very friable silt loam; weak fine granular structure; upper 2 inches stained dark (5YR 3/2) by organic matter.
- B_2 10 to 22 inches, reddish-brown (5YR 4/4) friable clay loam; weak fine blocky structure; many black specks and stains.
- B_3 22 to 40 inches, yellowish-red (5YR 4/6) or reddish-brown (5YR 4/4) friable clay loam; weak medium blocky structure; many black specks and stains; a few black concretions.
- C 40 inches +, yellowish-red (5YR 4/6) friable clay loam or silty clay loam; few distinct yellowish-brown mottles.

GRAY-BROWN PODZOLIC SOILS

Gray-Brown Podzolic soils are in the zonal soil order. They have thin organic coverings and thin organic-mineral layers over leached layers that rest upon illuviated B horizons. They have developed under a deciduous forest in a warm-temperate, moist climate. Their thin surface covering of leaf litter overlies a dark, thin, moderately acid humus layer that is somewhat mixed with the mineral soil. Their A_1 horizon is grayish brown and crumb structured, and their A_2 horizon is grayish brown to brown. The moderately heavy, blocky structured, yellowish-brown to reddish-brown B horizon becomes redder or lighter colored with increasing depth. The total depth of the solum varies considerably but seldom exceeds 4 feet. Podzolization is the main process in the development of these soils (*10*).

The causes of the development of Gray-Brown Podzolic soils instead of Red-Yellow Podzolic soils appear to be chiefly differences in parent materials and in length of time in developing. In this county Gray-Brown Podzolic soils are younger than most Red-Yellow Podzolic soils.

HAYTER SERIES.—The Hayter soils have developed in colluvium and local alluvium. These materials rolled or were washed from slopes underlain mainly by slate, much of which contains thin dikes of calcite. The influence of this calcite and other limestone is believed to be the chief factor that differentiates the Hayter soils from the Muse, Leadvale, and Jefferson soils. Hayter soils have much browner profiles and more organic matter than Jefferson soils. They differ from the Allen soils mainly in having a darker surface soil and a brown instead of red subsoil. They have moderate horizon development. They have formed in dominantly undulating and rolling relief under a rather dense hardwood forest. They are medium acid and relatively fertile.

The following describes a representative profile of Hayter silt loam:

- A_1 0 to 2 inches, very dark grayish-brown (10YR 3/2) very friable silt loam; contains a notable amount of partly disintegrated organic matter; moderate medium crumb structure.
- A_2 2 to 10 inches, dark-brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) very friable silt loam; weak medium granular structure.

B_1 10 to 15 inches, dark-brown (7.5YR 4/4) very friable silt loam; weak fine angular blocky structure; a few platy slate fragments as much as 3 millimeters in diameter.

B_{21} 15 to 31 inches, strong-brown (7.5YR 5/6) friable clay loam; weak fine angular blocky structure; a few platy slate fragments as much as 4 millimeters in diameter.

B_{22} 31 to 44 inches, strong-brown (7.5YR 5/6) to yellowish-brown (10YR 5/6) friable clay loam; weak fine to medium angular blocky structure; many platy slate fragments as much as 4 millimeters in diameter; below 44 inches material is lighter colored and contains more slate fragments than material above.

SEQUATCHIE SERIES.—In the Sequatchie series are deep, well-drained soils that occur on low terraces or second bottoms along the rivers and large creeks. They have developed in general mixed allvium similar to that of the closely associated Staser and Hamblen soils. Relief is nearly level to undulating. These soils have developed under a rather dense hardwood forest. Some of the parent material of the Sequatchie soils was so recently deposited that only a very weak profile has developed. Sequatchie soils are relatively fertile and medium acid to strongly acid.

Representative profile of Sequatchie loam:

A_1 0 to 2 inches, very dark grayish-brown (10YR 3/2) very friable loam; moderate medium crumb structure.

A_2 2 to 12 inches, dark-brown (10YR 4/3) very friable loam; moderate medium granular structure.

B_1 12 to 19 inches, dark yellowish-brown (10YR 4/4) very friable light clay loam; weak fine angular blocky structure.

B_2 19 to 44 inches, yellowish-brown (10YR 5/4) or strong-brown (7.5YR 3/6) friable clay loam; weak fine subangular blocky structure; few, fine, distinct gray and yellow mottles below a depth of 38 inches; below 44 inches, material is lighter colored and mottled or variegated with gray and yellow; many pebbles and cobbles.

Intrazonal soils

The intrazonal soils in the county are in the Planosol great soil group.

PLANOSOLS

Planosols have eluviated surface horizons underlain by B horizons more strongly illuviated, cemented, or compacted than those of associated zonal soils. These soils have developed on nearly flat uplands under grass or forest vegetation in a humid or subhumid climate (*10*).

The Whitwell soils are the only Planosols in Blount County. They have nearly level or slightly depressional relief and have decidedly impaired drainage. The B horizon in some areas is more dense than the B horizon in most zonal soils, but the degree of development of this layer varies.

Climatic conditions were similar to those under which the zonal soils developed, but much of the time Planosols are more moist and less well aerated than the zonal soils. The kinds of vegetation on Planosols and zonal soils probably differed to some extent, although deciduous forest was on all of them.

From the standpoint of profile development, the Planosols appear to be older than the Red-Yellow Podzolic soils, but the causes of development of older soils are not entirely known. Because of relief, geologic erosion is much slower on Planosols than on the Red-Yellow Podzolic soils, and this may account partly for the apparent greater manifestation of age. The soil material itself is not older in years than that of the associated zonal soils of similar relief. It is possible that relatively dense layers in the parent material and underlying rock strata caused slow internal drainage, which resulted in poor aeration and slow percolation of water out of the soil.

WHITWELL SERIES.—In the Whitwell series are imperfectly drained soils on low terraces or second bottoms along the rivers and large creeks. These soils have developed in general mixed alluvium similar to that from which the Sequatchie, Staser, and Hamblen soils have formed. They differ from the Sequatchie soils chiefly in being imperfectly drained. They differ from the Hamblen soils mainly in being older and in having moderately strong horizon development. They are level or nearly level and have developed under a hardwood forest that contained some water-tolerant trees. Whitwell soils are strongly acid. They are moderately fertile and contain a moderate amount of organic matter.

The following describes a representative profile of Whitwell loam:

A_2 0 to 8 inches, yellowish-brown (10YR 5/4) very friable loam; weak fine granular structure; in wooded areas the upper 1- to 2-inch layer is dark grayish brown.

B_1 8 to 16 inches, yellowish-brown (10YR 5/6) very friable loam to light clay loam; moderate medium granular and fine blocky structure.

B_2 16 to 32 inches, yellowish-brown (10YR 5/8) friable clay loam; common, fine, distinct, yellow and gray mottles; moderate fine subangular blocky structure.

B_{3m} 32 to 50 inches, yellowish-brown (10YR 5/8) clay loam; many, fine, distinct, yellow and gray mottles; compact in place but moderately friable; gray color more distinct with increasing depth.

Azonal soils

The azonal soils in Blount County are in the Lithosol and Alluvial great soil groups.

LITHOSOLS

Lithosols have no clearly expressed soil morphology. They consist of a freshly and imperfectly weathered mass of rock fragments and generally occur in rolling to steep areas (*10*). These soils occupy positions where geologic erosion is relatively rapid and consist of materials that are easily eroded. As a result, material is removed from the surface or is so mixed that soil-forming processes have not acted on it long enough to produce well-defined genetic soil properties. As mapped, these soils may include small areas of zonal soils.

DANDRIDGE SERIES.—The soils of the Dandridge series have formed from the residuum of calcareous shale. On the dominantly hilly to very steep topography, apparently geologic erosion has been almost rapid enough to keep pace with soil development. Consequently, the soils are shallow, contain numerous shale fragments,

and have very weakly developed profiles. These soils are slightly acid to neutral.

The following describes a representative profile:

0 to 1 inch, grayish-brown to dark grayish-brown (10YR 4/2 to 5/2), friable, granular silt loam.
1 to 8 inches, yellowish-brown (10YR 5/4) moderately friable heavy silt loam; strong medium granular structure; contains many soft and hard shale fragments.
8 inches +, yellowish-brown (10YR 5/4) moderately friable silty clay loam soil material mixed with leached, partially leached, and unleached shale fragments; calcareous shale bedrock is at a depth of 17 inches.

LITZ SERIES.—The Litz soils are well drained to excessively drained shallow soils. They have developed chiefly from soft, acid shale. In places the bedrock contains thin lenses of limestone or calcareous shale, but the limestone has disappeared through weathering and only shale remains at the surface. The parent rock differs from that of the Dandridge soils in being leached to a depth of several feet. Litz soils are dominantly hilly. They have formed under a predominantly deciduous forest. Because of the strong slopes, geologic erosion has closely followed soil formation. These soils are strongly acid and low in fertility and organic matter.

The following describes a typical profile:

A_1 0 to 1 inch, very dark grayish-brown (10YR 3/2) very friable silt loam; weak fine crumb structure.
A_2 1 to 8 inches, yellowish-brown (10YR 5/6) friable silt loam; moderate medium granular structure; a few small soft or well-leached shale fragments.
C 8 to 15 inches, strong-brown and brownish-yellow friable silty clay loam soil material mixed with soft shale fragments; leached shale bedrock at a depth of 15 inches.

MONTEVALLO SERIES.—In this series are very shallow shaly soils developed from variegated but dominantly light-colored acid shale. They differ from the Litz soils mainly in being lighter colored and shallower to bedrock and in lacking calcareous material in the parent rock. They occur on moderately steep slopes. The native vegetation was mixed pines and hardwoods. Montevallo soils are very strongly acid and very low in organic matter and fertility.

The following describes a profile of Montevallo soil:

A_2 0 to 7 inches, light brownish-gray (2.5Y 6/2) friable silt loam; weak medium granular structure; contains many soft shale fragments.
C 7 inches +, predominantly greenish- and grayish-colored silty soft shales with a small admixture of light brownish-gray friable silt loam soil material; soft, leached bedrock at a depth of 12 inches.

TEAS SERIES.—The Teas soils are excessively drained and shallow. They have developed from interbedded, fine-grained sandstone, siltstone, and shale. The purplish or pinkish color of the bedrock is imparted to the overlying soil material. Calcareous seams or lenses are common in the bedrock. The topography is dominantly hilly and steep, and geologic erosion has been so rapid that only a thin covering of soil material has accumulated. On the less sloping parts of the ridge crests, there is often a weak illuvial layer. The native vegetation was a mixed pine and hardwood forest, probably dominantly hardwoods. Teas soils are strongly acid and low in fertility.

The following describes a representative profile of undisturbed Teas loam on a ridge crest:

0 to 1 inch, dark-brown (7.5YR 3/2) very friable loam; weak medium crumb structure; a few angular fragments of sandstone and sandy shale as much as 0.5 inch in diameter.
1 to 6 inches, dark reddish-gray (5YR 4/2) to reddish-brown (5YR 4/3) very friable loam; moderate fine and medium granular structure; a few angular fragments of sandstone and sandy shale as much as 0.5 inch in diameter.
C_1 6 to 18 inches, dark reddish-brown (2.5YR 3/4) and near dusky-red (10R 3/3) friable loam or clay loam; many red-colored fragments of sandstone and sandy shale as much as 1 inch in diameter make up about 10 percent of the entire mass.
C_2 18 to 26 inches, red (2.5YR 4/8) friable clay loam or loam soil material mixed with soft leached fragments of sandstone and sandy shale; bedrock at a depth of 26 inches.

RAMSEY SERIES.—This series consists of shallow, well drained or excessively drained soils on mountain slopes. These soils were derived from acid sandstones, quartzites, shales, and slates. The topography ranges from hilly to very steep but is dominantly steep and very steep. The native vegetation was mixed pine and hardwood forest.

Because the rocks under the Ramsey soils weather slowly, their parent material formed very slowly. This material is removed by geologic erosion almost as rapidly as it is formed, and the soils are very shallow and do not have well-developed profiles. They are strongly acid and low in fertility. The chief variations in the soil material are color and texture. The parts derived from slate are brown in color and finer textured than are those derived from sandstones and quartzites.

COLBERT SERIES.—This series consists of shallow soils on limestone uplands. The parent rock is argillaceous limestone. These soils contain a large amount of clay throughout the profile. They are associated with the Talbott soils but are shallower to bedrock and have a yellowish-brown subsoil, whereas the Talbott soils have a yellowish-red subsoil. The range of profile development is broad within this series. On the more level areas, the profile is at least moderately well developed, as indicated by the texture and structure of the B horizon. On the more sloping parts, the soil is shallow to bedrock and the profile is lithosolic. Colbert soils have formed on dominantly rolling relief under a hardwood forest.

The following is a representative profile of Colbert silty clay loam in a cultivated field:

A_p 0 to 5 inches, dark grayish-brown (10YR 4/2) moderately friable silty clay loam; strong fine and medium subangular blocky structure.
A_3 5 to 8 inches, dark yellowish-brown (10YR 4/4) mingled with grayish-brown (10YR 4/2) firm silty clay loam; strong medium subangular blocky structure.
B_2 8 to 20 inches, yellowish-brown (10YR 5/8) to light olive-brown (2.5Y 5/6) very firm clay; strong coarse subangular blocky structure, nearly massive.
C_1 20 to 24 inches, yellowish-brown (10YR 5/8) very firm clay; common, medium, distinct strong brown (7.5YR 5/6) mottles; structureless; massive.
D_r Argillaceous limestone bedrock.

LEHEW SERIES.—In the Lehew series are shallow, excessively drained soils on uplands. They have formed from the residuum of red, yellow, and brown acid sandstones and red, brown, and green acid sandy shales. Few of the beds of sandstone are more than 2 or 3 feet thick. They are not continuous for any great distance; they are repeatedly interbedded with shales. The shales are very thin, and small seams of sandstone are interbedded with them. Some of the shales are pinkish or purplish, and they impart these colors to the overlying soil material. Lehew soils generally occupy high linear ridges that have steep sides and narrow even crests. Because of the steep slopes, geologic erosion has kept almost even pace with rock weathering, and only a thin covering of soil material has accumulated. Lehew soils are low in fertility and organic matter and are strongly acid.

The following describes a representative profile:

A_1 0 to 1 inch, very dark brown (10YR 2/2) or dark reddish-brown (5YR 3/2) very friable very fine sandy loam; weak fine crumb structure.

A_2 1 to 8 inches, reddish-brown (5YR 4/3) very friable very fine sandy loam; weak fine granular and crumb structure.

C_1 8 to 17 inches, reddish-brown (2.5YR 4/4) very friable very fine sandy loam; a few soft fragments of sandstone and sandy shale are mixed with the soil.

C_2 17 inches +, reddish-brown (2.5YR 4/4) very friable very fine sandy loam soil material mixed with leached and partially leached shale and sandstone fragments; locally, the depth to bedrock is 21 inches; in places the bedrock is within a few inches of the surface and outcrops are common.

BLAND SERIES.—The Bland soils are well drained to excessively drained shallow soils of the uplands. They have developed from the weathered products of a calcareous mudstone or shaly limestone. The red or purplish color of the bedrock is imparted to the overlying soils. The soils derived from the residuum of this formation vary from very shallow weak Lithosols to moderately shallow mature zonal soils. They occur in hilly to steep highly dissected uplands that have narrow, winding ridge crests. They are slightly acid and low in organic matter.

The following describes a profile of Bland silt loam:

A_1 0 to ½ inch, dark reddish-brown (5YR 2/2) very friable silt loam; moderate fine crumb structure.

A_3 ½ to 7 inches, dusky-red (10R 3/3) friable silt loam; moderate medium granular structure; a few small fragments of mudstone or limestone about 0.5 inch in diameter.

C 7 to 20 inches, weak-red (2.5YR 4/2) or dusky-red (2.5YR 3/2) firm silty clay or silty clay loam soil material mixed with red rock fragments; fragments as much as 10 inches in diameter; dusky-red bedrock underlies this layer.

ALLUVIAL SOILS

Alluvial soils are developing from transported and relatively recently deposited alluvium that has had little or no modification by the soil-formation processes (*10*). In Blount County these soils are on first bottoms along streams, in depressions, and along drainways. They are nearly level, gently sloping, or depressional and have medium to very slow internal drainage. The main properties that these soils have in common are those related to a lack of a soil profile in which the horizons are genetically related. The properties of the soil are closely related to the alluvial deposit.

Alluvial soils developed from similar parent material under dissimilar drainage have differences that are the result of the dissimilar drainage. Accordingly, the Alluvial soils have been differentiated on the basis of properties associated with good, imperfect, and poor drainage, as well as on differences in parent materials.

BRUNO SERIES.—Bruno loamy fine sand is the only soil of the Bruno series mapped in Blount County. This soil occurs on first bottoms in recent alluvium that was washed largely from uplands underlain by sandstone and quartzite. It contains more sand than the associated Staser soils and is generally lighter in color. These coarser materials were deposited on natural levees by swift-flowing water. The Bruno soil is excessively drained. To a depth of several feet, it consists of yellowish-brown or light yellowish-brown loose loamy fine sand. In places there are strata of coarser material below 2 feet. This soil is acid and low in fertility.

STASER, HAMBLEN, AND PRADER SERIES.—The Staser, Hamblen, and Prader soils are developing in recent mixed general alluvium. The materials were derived dominantly from shale, quartzite, sandstone, and slate, but they include small amounts of limestone material in most places. They have formed on nearly level flood plains under deciduous forest. All are subject to flooding except where protected by man-made structures. These soils differ from the soils of the Huntington-Lindside-Melvin catena chiefly in being somewhat lighter colored, a little lower in fertility, and generally coarser textured. The Huntington member of this catena is not mapped in Blount County.

The differences among the Staser, Hamblen, and Prader soils are closely associated with differences in drainage. The soils of all three series are young and do not have well-developed profiles. They are generally higher in bases and organic matter than the associated soils of the uplands.

The Staser soils are well drained. They consist of brown or grayish-brown material ranging in texture from silt loam to fine sandy loam. Below depths of 30 to 32 inches, the material is mottled with yellow and gray and the texture is commonly finer than that of the surface layer. In some places, however, the texture is coarser below depths of 30 to 32 inches than it is in the surface layer. Most areas are typically stratified. In many areas an older dark-brown surface layer has been buried at depths of 12 to 24 inches by very recent deposits. The Staser soils are slightly acid in most places.

The Hamblen soils are imperfectly drained. They consist of yellowish-brown to grayish-brown soil material that ranges in texture from silt loam to loam. They are generally slightly finer textured than the Staser soils. The material is well drained and very friable to a depth of about 16 inches. Below this depth is mottled brown, yellow, and gray material that is slightly finer textured than the surface layer. The gray color is dominant at a depth of 26 inches. The differences in texture may result from the soil-forming proc-

ess in some places, but in other places the differences are probably the result of differences in the conditions under which deposition took place. Hamblen soils are generally slightly acid.

Prader silt loam is the only Prader soil mapped in Blount County. This soil is poorly drained and predominantly gray or gray mottled with yellow. The surface inch contains enough organic matter to give it a dark cast. Between depths of 1 to 7 inches the material is grayish-brown to yellowish-brown moderately friable silt loam. Below a depth of 7 inches is a dominantly gray silty clay loam to heavy silt loam. The gray layers of the Hamblen and Prader soils are the result of gleization.

LINDSIDE AND MELVIN SERIES.—The Lindside and Melvin soils occur on recent stream alluvium that originated chiefly from limestone. They are young and have not developed genetically related horizons. They occur on level to nearly level flood plains where practically all areas are subject to flooding and the deposit of sediments. These soils differ from the Hamblen and Prader soils chiefly in consisting of materials that were derived dominantly from limestone. They are slightly darker colored and finer textured than the Hamblen and Prader soils.

Lindside silt loam is the only Lindside soil mapped in the county. It is imperfectly drained and consists of dark-brown friable silt loam to a depth of about 16 inches. Below this depth is mottled brown, yellow, and gray moderately friable silt loam to silty clay loam. The gray color is generally at a depth of about 24 inches. In a few places the texture of the surface soil ranges from silt loam to light silty clay loam. The subsoil also has a range in texture, part of which may result from soil-forming processes. In most places, however, this range is probably the result of differences in parent material and in deposition.

The Melvin soil is an Alluvial soil with a gley horizon. Under average conditions, the entire profile is relatively gray, as compared to the profile of the Lindside soil, and the subsoil is definitely gray. The 7-inch surface layer is usually a grayish-brown moderately friable silt loam. Below this the material is dominantly gray heavy silt loam to silty clay loam. In some areas the Melvin soil has some characteristics of the Planosols; the subsoil is more compact and clayey than the surface soil.

NEUBERT SERIES.—Neubert loam is the only Neubert soil mapped separately in Blount County, but this mapping unit has some fine sandy loam inclusions. It is a deep, well-drained soil that occurs on recent local alluvium or colluvium. The materials have washed mainly from the Tellico soils. This soil is nearly level to gently sloping and occupies foot slopes, fans, and narrow strips along intermittent drainways. It is similar to the Emory soils, but its parent materials are more sandy or siliceous than the Emory parent materials. Neubert soils are medium acid and relatively high in fertility.

The following describes a representative profile of Neubert loam:

0 to 15 inches, reddish-brown (5YR 4/4) very friable loam.
15 to 36 inches +, reddish-brown (5YR 4/4) to dark-brown (7.5YR 4/2) very friable loam; grades to light clay loam in a few places; below a depth of 36 inches, the material is mottled with yellowish brown; calcareous sandstone or sandy shale bedrock at depths of 3½ to 15 feet.

EMORY SERIES.—This series consists of deep, well-drained soils that occur in recent local alluvium. The alluvium was washed from Decatur, Dewey, Cumberland, and other red upland soils. The materials have not been in place long enough for genetically related soil horizons to have developed. In some places, however, incipient development occurs. Emory soils occupy nearly level to gently sloping areas on foot slopes, narrow strips along intermittent drains, alluvial fans, and the floors of limestone sinks. They differ from the Greendale soils mainly in being browner throughout the profile.

The following describes a typical profile of Emory silt loam:

0 to 18 inches, dark reddish-brown (5YR 3/4) or dark-brown (7.5YR 3/2) friable silt loam.
18 to 40 inches +, reddish-brown to dark-brown friable silt loam; texture may range to light silty clay loam in places; a few yellowish-brown mottles below a depth of 36 inches; depth of deposit seldom less than 3 feet and generally ranges between 5 and 10 feet; practically all areas are underlain by limestone residuum.

GREENDALE SERIES.—Greendale silt loam is the only Greendale soil mapped in Blount County. This soil occurs on foot slopes, along intermittent drains, and on alluvial fans. It consists of materials washed from the adjacent slopes, mainly from the Dunmore and Fullerton soils. The material is lighter colored, more siliceous, more strongly acid, and lower in bases than that from which the Emory soils have formed. Most Greendale soils are so young and have such indistinct or weakly developed profiles that they are included with the Alluvial soils. In some places, however, the profile is weakly developed.

The following describes a representative profile of Greendale silt loam:

0 to 12 inches, yellowish-brown (10YR 5/4) to brown (10YR 5/3) very friable silt loam; in wooded areas the upper 2 inches is stained dark with organic matter.
12 to 32 inches, yellowish-brown to light yellowish-brown (10YR 5/4 to 6/4) friable heavy silt loam; layer grades to light silty clay loam in a few areas.
32 inches +, yellowish-brown (10YR 5/4) friable heavy silt loam; common, fine, distinct, brownish-yellow and gray mottles; underlying limestone residuum at depths of 4 to 10 feet.

WHITESBURG SERIES.—Whitesburg silt loam is the only soil of the Whitesburg series mapped in Blount County. It is developing in recent local alluvium or colluvium that originated chiefly from calcareous shale. It occupies foot slopes and strips along the intermittent drains that extend throughout landscapes dominated by Dandridge soils. Most areas are moderately well drained, but some are imperfectly drained. Small wet spots or seeps are common because this soil receives large quantities of runoff and seepage water. It is

young and has little or no profile development. It is slightly acid to neutral and about medium in fertility.

The following describes a representative profile of Whitesburg silt loam:

0 to 15 inches, dark yellowish-brown (10YR 4/4) friable silt loam.
15 to 20 inches, dark yellowish-brown (10YR 4/4) friable silt loam or light silty clay loam; few, fine, faint, gray mottles.
20 inches +, mottled light brownish-gray and brown firm silty clay loam; the gray is more predominant with increasing depth; depth to calcareous shale bedrock generally ranges from 3 to 4 feet.

BARBOURVILLE SERIES.—This series consists of deep, well-drained soils on recent local alluvium or colluvium. These deposits have originated chiefly from acid slate, shale, sandstone, or quartzite. In this county most of the materials have washed from the Ramsey soils.

Barbourville soils occupy very gentle foot slopes, alluvial-colluvial fans, and narrow strips along intermittent drains. They are not likely to be flooded, but they do receive sediments or local alluvium that has been washed from the adjacent upland slopes. The materials are so young that only very weak horizons have developed. These soils are generally medium acid to strongly acid.

The following describes a profile of Barbourville fine sandy loam:

0 to 10 inches, brown (10YR 5/3) or yellowish-brown (10YR 5/4) very friable fine sandy loam.
10 to 34 inches, yellowish-brown (10YR 5/4) friable fine sandy loam or loam.
34 inches +, yellowish-brown (10YR 5/4) friable sandy loam or fine sandy loam; common, fine, distinct, yellow and gray mottles; depth of the deposit generally is more than 4 feet.

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines soils in the field, classifies the soils in accordance with facts that he observes, and maps their boundaries on an aerial photograph or other base map.

FIELD STUDY.—The soil surveyor bores or digs many holes to see what the soils are like. In most soils, each boring or excavation reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile and to learn the things about the soil that influence its capacity to support plant growth.

Color is usually related to the amount of organic matter and of mineral elements such as iron and manganese. Drainage and aeration also have a strong effect upon color. Gray colors or streaks of gray and yellow in the lower layers generally indicate poor drainage or poor aeration.

Texture, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers, and it may be later checked by laboratory analysis. Texture, to a large extent, determines how well the soil supplies moisture and retains plant nutrients or fertilizer elements and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged into aggregates, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture.

Consistence, or the resistance of the soil to deformation or crumbling, indicates whether the soil is easy or difficult to work and its condition of tilth.

Other characteristics observed in the course of the field study and important in classifying the soils include the following: The depth of the soil over bedrock or compacted layers; the presence of gravel, cobbles, or stones that will interfere with cultivation; the steepness and pattern of slopes; internal drainage; the nature of the underlying parent material from which the soil has developed; and the acidity or alkalinity of the soil as measured by chemical tests.

CLASSIFICATION.—On the basis of the characteristics observed by the survey party or determined by laboratory tests, soils are classified by series, types, and phases. The soil type is the basic classification unit. A soil type may consists of several phases. A series may also consist of several types. Types that are similar in most of their characteristics are grouped in one soil series.

As an example of soil classification, consider the Barbourville series. This series is made up of two soil types subdivided into three phases as follows:

Series	*Type*	*Phase*
Barbourville	Fine sandy loam	Gently sloping phase.
	Silt loam	Gently sloping phase.
		Sloping phase.

Soil type.—Soils similar in kind, thickness, and arrangement of the soil layers are classified as one soil type.

Soil phase.—Because of differences other than those of kind, thickness, and arrangement of layers, some soil types are divided into two or more phases. Slope variations, frequency of bedrock outcrops, degree of erosion, or depth of soil over bedrock are examples of characteristics that suggest dividing a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range in characteristics. Use and management practices, therefore, can be specified more easily for the soil phase than for soil series or broader groups that contain more variation.

Soil series.—Two or more soil types that differ in surface texture but are otherwise similar in kind, thickness, and arrangement of soil layers are normally designated as a series. In a given area, however, it frequently happens that a soil series is represented by only one soil type. Each series is named for a place near which it was first mapped.

Miscellaneous land types.—Areas that have little true soil are not classified by series and types but are identified by descriptive names. Examples in Blount County are Gullied land, limestone material; Rockland, limestone, sloping; Rockland, limestone, moderately steep; and Stony colluvial land.

469687—59——7

SOIL CORRELATION is the process of assigning uniform names to soils of various areas. This is part of a nationwide system of mapping and classifying soils. The purpose of soil correlation is to show similarities and differences among the soils of each surveyed area and the rest of the United States. To do this, the same combination of soil characteristics is given the same name, wherever found.

A more detailed discussion of the methods used in soil surveying can be found in the Soil Survey Manual (*11*). Fuller definition of some of the foregoing terms, as well as definitions of unfamiliar terms used in this report, can be found in the glossary.

Engineering Characteristics of Soils[5]

This soil survey report contains information that can be used by engineers to:

1. Make studies of soil and land use.
2. Make estimates of runoff and erosion characteristics.
3. Make reconnaissance surveys of soil and ground conditions for highway and airport location.
4. Locate sand and gravel.
5. Correlate pavement performance with soils.
6. Determine the suitability of soil units for cross-county movement of vehicles and construction equipment.
7. Supplement other sources of information in making engineering soil maps.

The mapping and the descriptive report are somewhat generalized, however, and should be used primarily in planning more detailed field investigations to determine the in-place condition of the soil at the proposed construction site.

Some of the engineering characteristics of the soils of Blount County are shown in tables 29, 30, 31, and 32. This information includes soil test data from selected soils, brief engineering descriptions of the mapping units, estimated physical properties of the soils, and soil features affecting highway and conservation work.

Some of the terms used by the agricultural soil scientist may be unfamiliar to the engineer, and some words—for example, soil, clay, silt, sand, topsoil, aggregate, and granular—may have special meanings in soil science. These terms are defined as follows:

Soil: The natural medium for the growth of plants on the surface of the earth; composed of organic and mineral materials.

Clay: A soil separate or size group of mineral particles less than 0.002 millimeter in diameter. As a textural class, clay consists of soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Silt: A soil separate ranging in diameter from 0.05 to 0.002 millimeter. As a textural class, silt consists of soil material that contains 80 percent or more silt and less than 12 percent clay.

Sand: A soil separate ranging in diameter from 2.0 to 0.05 millimeter. As a textural class, sand consists of soil material that contains 85 percent or more sand, and the percentage of silt plus 1½ times the percentage of clay shall not exceed 15.

Topsoil: Presumably fertile soil material used to topdress roadbanks, gardens, and lawns.

Aggregate: A cluster of primary soil particles held together by internal forces to form a clod or fragment.

Granular structure: Individual grains grouped into spherical aggregates that have indistinct sides. Highly porous granules are commonly called crumbs.

To make the best use of the soil map and the soil survey report, the engineer should know the physical properties of the soil materials and the in-place condition of the soil. After testing the soil materials and observing the behavior of each of these soils when used in engineering structures and foundations, the engineer can develop design recommendations for each soil unit delineated on the map.

Soil Engineering Test Data

Soil samples from the principal soil type of each of 17 extensive soil series were tested in accordance with standard procedures (*1*) to help evaluate the soils for engineering purposes. The test data are given in table 29. Because the soil materials tested were generally obtained from depths of less than 6 feet, they do not represent the materials that would be found in earthwork at greater depths. The table contains data obtained in moisture-density tests, mechanical analyses, and plasticity tests.

In the moisture-density or compaction test, soil material is compacted into a mold several times with a constant compactive effort, each time at a successively higher moisture content. The dry density (unit weight) of the soil material increases as the moisture content increases, until the optimum moisture content is reached. After that, the dry density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed "maximum dry density." Moisture-density data are important in earthwork because, as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

The results of the mechanical analysis, obtained by combined sieve and hydrometer methods, may be used to determine the relative proportions of the different size particles making up the soil sample. The clay content obtained by the hydrometer method should not be used in naming soil textural classes.

The values of the liquid limit and plasticity index indicate the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a solid to semisolid, or plastic, state. As the moisture content is further increased, the material changes

[5] This section was prepared by the Division of Physical Research, Bureau of Public Roads, in cooperation with Soil Conservation Service.

from a plastic to a liquid state. The plastic limit is the moisture content at which the material passes from a solid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Table 29 also gives two engineering classifications for each soil sample. These classifications are based upon the data of the mechanical analysis, the liquid limit, and the plasticity index; they are briefly described in the subsection, Engineering Soil Classification.

Engineering Descriptions

Selected characteristics significant to engineering are given in table 30 for each mapping unit. This table gives the engineering classification of the soil materials that occur below the top 8 to 12 inches; the kind of rock from which this material was derived; the kind of bedrock; the occurrence of large stones, gravel and sand; and other significant characteristics. Also included are predominant surface slope, depth to seasonally high water table, depth to bedrock, and the natural drainage class.

The depths to the seasonally high water table are based on field observations. Comparisons between depths to bedrock and to water table reveal that in many cases the ground-water surface lies within the bedrock. This is possible within pervious sedimentary deposits and cavernous limestone. Depths to bedrock for the steeper and more eroded phases will tend to be at the lower end of the range given in the table.

Physical Properties

Estimated in-place physical properties are given in table 31 for the layers of soil material in one or more typical profiles of the extensive soil types or phases of each series. Only limited information is available concerning the soil material of Gullied land, Rockland, and the Talbott-Colbert stony and very rocky soils. Table 31 gives engineering classifications, soil structure, permeability, available moisture-holding capacity, suitability as topsoil, shrink-swell potential, and the degree of acidity expressed in pH. The values in table 31 are based largely on field observations and evaluations, most of which are described in other parts of this report.

Features Affecting Engineering Work

Table 32 lists specific adverse or beneficial features of each soil series, soil type, or land type that may affect highway work or soil- and water-conservation work. These features are generally not apparent to the engineer unless he has access to the results of a field investigation. They are, however, significant enough to influence construction practices. Where no feature of a listed soil unit is given in one of the columns of table 32, no unusual problems are expected for that soil.

The location of highways in areas where the soils are sloping, moderately steep, or steep may be influenced by the depth to bedrock and the kind of bedrock. The engineer should investigate how difficult it is to excavate the rock, how likely slides are to occur in the dipping strata, and how likely water is to seep along or through the bedrock. Furthermore, in the location of a highway, the presence of poor material within or slightly below the subgrade should be considered. A highly plastic clay layer impedes internal drainage and provides a poor foundation. In some places the clay layer should be cut out before the pavement is constructed. If this is not feasible, as might be the case in low, flat, or poorly drained areas, the roadway should be built well above the plastic clay layer by using an embankment section. The occurrence of boulders, cobbles, and stones, which might cause a grading problem, are noted.

Vertical alinement of roads is also affected by poor drainage. An embankment section should be constructed to keep the roadway above high water in places where there is a seasonably high water table or occasional flooding. Interceptor ditches or underdrains may be needed where there is subsurface seepage, which is common at the base of slopes in deposits of local alluvium. The slumping or sliding of the overlying material may be a result of seepage in the backslopes of cuts.

Throughout most of Blount County during prolonged wet periods, earthwork is difficult, but it is possible to excavate, haul, and compact the better drained, coarse-grained soil materials. The silty and clayey materials may absorb so much water during wet periods that they cannot be readily dried to the moisture content that is most favorable for proper compaction.

A rating of the suitability as a source of subbase material for each soil series, soil type, or land type is also given in table 32. As a general rule, the most desirable materials are very coarse grained and easily drained. These materials normally occur in deposits of alluvium derived from sandstone or quartzite.

Naturally occurring materials that are suitable for use in base coarses are scarce in Blount County. Suitable gravel deposits have been found in Barbourville silt loam and Ramsey stony fine sandy loam, but generally the gravel deposits are small. Chert gravel may be used economically for secondary and county roads, but normally it is not durable enough to be used in concrete structures or for base material for primary roads. Crushed limestone is much more satisfactory. There are several quarries in the county, all in Gullied land, limestone; Rockland, limestone; or Talbott-Colbert very rocky silty clay loams.

The engineering problems of soil and water conservation are generally confined to the installation of drainage tile and the construction of drainage channels and farm ponds. No unusual problems are expected in irrigation or upland conservation. Only the small tobacco and truck patches are generally irrigated,

TABLE 29.—*Engineering test data*[1] *for*

Soil type and location	Parent material	Bureau of Public Roads report No.	Depth	Horizon	Moisture-density	
					Maximum dry density	Optimum moisture
			Inches		*Lb. per cu. ft.*	*Percent*
Cumberland silty clay loam:						
0.25 mile northwest of Russell Cemetery.	Mixed alluvium primarily from limestone.	88044	0–8	A_2	103	20
		88045	8–19	B_1	107	19
		88046	19–60	B_2	101	24
0.2 mile east of Little River on U. S. Highway 411.	Mixed alluvium primarily from limestone.	88023	1–8	A_2	112	15
		88024	8–72	B_2	100	23
		88025	72–84		96	27
Decatur silty clay loam:						
0.2 mile north of Wildwood	Dolomitic limestone	88031	1–8	A_2	113	16
		88032	8–34	B_2	105	20
		88033	34–48	C	91	28
Dewey silt loam:						
1.0 mile southeast of Clover Hill	Dolomitic limestone	88071	0–8	A_2	108	16
		88072	19–40	B_2	114	15
		88073	40–60	B_3 and C	96	26
2.2 miles northwest of Forest Hill	Dolomitic limestone	88055	0–7	A_2	109	15
		88056	13–37	B_2 and B_3	113	17
		88057	37–50	C	119	13
Dunmore silt loam:						
2.5 miles northwest of Forest Hill	Dolomitic limestone	88058	0–6	A_2	105	17
		88059	6–19	A_3 and B_1	110	19
		88060	19–41	B_2	98	24
		88061	41–60	C	93	28
0.5 mile north of Providence Church.	Dolomitic limestone	88026	0–7	A_2	112	14
		88027	7–22	B_2	88	31
		88028	22–40	C	89	30
0.2 mile north of Mt. Lebanon Church.	Dolomitic limestone	88037	0–7	A_2	107	16
		88038	7–17	A_3 and B_1	117	14
		88039	17–33	B_2	93	29
		88040	33–48	C	91	29
Emory silt loam:						
1.0 mile southeast of Clover Hill	Alluvium from limestone	88064	0–18		101	21
		88065	18–40		110	18
0.8 mile north and slightly west of Russell Cemetery.	Alluvium from limestone	88050	0–18		102	22
		88051	18–40		98	25
Farragut silty clay loam:						
University of Tennessee County Farm (small inclusion of less eroded Farragut).	Limestone with thin lenses of shale	88047	1–7	A_2	108	17
		88048	7–25	B_2	102	22
		88049	25–40	C	96	27
Hamblen silt loam:						
1.2 miles north of Clover Hill	Mixed alluvium	88091	0–14		105	20
		88092	14–36		105	19
Jefferson fine sandy loam:						
0.2 mile northeast of Montvale Springs (small inclusion in Jefferson cobbly fine sandy loam that is practically free of cobbles).	Local alluvium or colluvium	88074	0–9	A_2	110	15
		88075	15–39	B_1 and B_2	115	15
		88076	39–60	B_3 and C	114	16
1.0 mile southwest of Rocky Branch School.	Local alluvium or colluvium	88082	0–10		108	16
		88083	10–30		117	14
		88084	30–48		113	16

See footnotes on page 102.

soil samples taken from 29 soil profiles

Mechanical analysis[2]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve							Percentage smaller than						A.A.S.H.O.[3]	Unified[4]
1-in.	¾-in.	⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
	100	99	99	98	92	74	72	57	39	33	40	17	A-6(11)	CL
	100	99	99	98	93	80	79	70	53	47	45	22	A-7-6(14)	CL
			100	99	93	78	76	67	54	51	49	20	A-7-6(14)	ML-CL
		100	99	98	92	68	65	49	29	22	29	12	A-6(8)	CL
		100	99	98	94	78	78	72	57	52	50	18	A-7-5(13)	ML
				100	97	87	86	79	65	58	58	20	A-7-5(16)	MH
		100	98	96	92	77	74	57	35	28	30	13	A-6(9)	CL
			100	95	92	83	82	69	52	45	47	28	A-7-6(17)	CL
				100	98	91	90	84	71	65	62	24	A-7-5(18)	MH
100	99	96	95	94	92	70	68	51	26	14	27	7	A-4(7)	ML-CL
				100	99	70	69	57	44	29	34	15	A-6(9)	CL
			100	99	96	77	77	73	65	57	59	27	A-7-5(19)	MH-CH
100	97	95	92	89	85	66	65	51	25	15	25	7	A-4(6)	ML-CL
			100	99	97	85	84	67	43	32	38	20	A-6(12)	CL
		100	99	98	95	81	79	61	33	21	29	13	A-6(9)	CL
100	97	91	85	79	73	66	65	48	24	13	30	8	A-4(6)	ML-CL
		100	99	97	94	89	88	74	48	31	35	16	A-6(10)	CL
		100	99	97	94	90	90	80	63	51	55	27	A-7-6(18)	MH-CH
				100	99	98	97	91	78	68	68	36	A-7-5(20)	MH-CH
	100	98	93	86	80	71	71	55	26	14	26	6	A-4(7)	ML-CL
			100	98	96	93	93	87	68	60	68	34	A-7-5(20)	MH-CH
				100	99	97	96	92	81	71	68	32	A-7-5(20)	MH
100	98	91	84	79	74	69	67	50	25	16	29	8	A-4(7)	ML-CL
	100	99	95	91	84	84	68	39	26	32	13	A-6(9)	CL
	100	99	98	96	93	90	90	85	72	63	60	28	A-7-5(19)	MH-CH
	100	99	94	90	85	83	83	80	72	62	65	30	A-7-5(20)	MH
				100	97	89	87	65	39	29	38	12	A-6(9)	ML-CL
				100	95	83	82	66	43	32	35	14	A-6(10)	CL
				100	99	96	96	85	59	45	45	21	A-7-6(13)	CL
				100	99	96	96	75	54	49	46	22	A-7-6(14)	CL
				100	98	72	70	57	35	28	29	10	A-4(7)	CL
				100	99	82	78	68	55	48	54	25	A-7-6(17)	MH-CH
				100	99	86	85	77	65	56	63	28	A-7-5(19)	MH
			100	98	93	87	83	62	31	26	38	14	A-6(10)	ML-CL
			100	99	93	87	86	67	34	26	36	14	A-6(10)	CL
				100	95	70	68	51	28	20	28	8	A-4(7)	CL
				100	96	72	72	60	34	25	32	13	A-6(9)	CL
	100	99	99	99	95	65	63	51	33	29	33	13	A-6(7)	CL
				100	95	72	71	51	22	14	26	5	A-4(7)	ML-CL
				100	97	76	74	55	25	17	24	8	A-4(8)	CL
	100	98	98	97	92	63	62	49	30	21	30	10	A-4(6)	CL

TABLE 29.—*Engineering test data*[1] *for soil*

Soil type and location	Parent material	Bureau of Public Roads report No.	Depth	Horizon	Moisture-density	
					Maximum dry density	Optimum moisture
			Inches		*Lb. per cu. ft.*	*Percent*
Leadvale silt loam:						
0.5 mile east of Rocky Branch School.	Alluvium from shale	88088	0–8		112	15
		88089	8–18		116	15
		88090	18–36		102	22
1.5 miles north and west of Wildwood.	Alluvium from shale	88034	0–8	A_2	109	18
		88035	17–31	B_2	98	24
		88036	31–48	C	98	26
Litz silt loam:						
0.3 mile north of Clover Hill	Shale	88062	1–7	A	106	18
		88063	7–27	C	93	26
1.5 miles north of Providence Church.	Shale	88029	0–6	A	100	22
		88030	6–18	C	100	21
Melvin silt loam:						
4.0 miles north of Brick Mill	Mixed alluvium primarily from limestone.	88066	0–9		102	22
		88067	9–40		110	18
Sequatchie loam:						
0.8 mile southwest of Chilhowee along U. S. High 129, about halfway between highway and Little Tennessee River.	Mixed alluvium	88079	0–10		113	15
		88080	10–32		115	14
		88081	32–48		114	15
Sequoia silty clay loam:						
3.0 miles southwest of Binfield	Shale	88068	0–7	A_2	110	14
		88069	14–34	B_2	109	18
		88070	34–56	B_3 and C	98	24
1.0 mile south of Rockford	Shale	88041	0–8	A_2	109	16
		88042	12–31	B_2	90	30
		88043	31–50	C	89	30
0.6 mile south of Alnwick	Shale	88020	0–8	A_2	104	19
		88021	8–23	B_2	99	24
		88022	23–48	C	98	24
Staser loam:						
1.0 mile west of Calderwood along Little Tennessee River.	Mixed alluvium	88077	0–14		107	18
		88078	14–36		116	14
Talbott silt loam:						
2.0 miles north of Miser Station	Clayey limestone	88011	1–7	A_2	101	22
		88012	7–18	B_2	92	27
		88013	18–24	C	93	28
Tellico loam:						
0.5 mile south of Kit Carson School	Calcareous sandstone and sandy shale	88052	0–8	A_2	113	15
		88053	8–32	B_2	106	20
		88054	32–72	C	107	20
1.0 mile east of Miser	Calcareous sandstone and sandy shale	88014	0–7	A_2	119	13
		88015	7–47	B_2	100	24
		88016	48–72	C	97	27
1 mile south of Middle Settlement School.	Calcareous sandstone and sandy shale	88017	0–7	A_2	113	13
		88018	7–29	B_2	107	20
		88019	29–60	C	98	26
Waynesboro loam.						
1.5 miles east of Hubbard	Mixed alluvium	88085	0–8	A_2	113	13
		88086	8–42		102	20
		88087	42–72		103	21

See footnotes on page 102.

samples taken from 29 soil profiles—Continued

Mechanical analysis[2]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve							Percentage smaller than							
1-in.	¾-in.	⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			A.A.S.H.O.[3]	Unified[4]
				100	97	80	74	50	23	14	24	6	A-4(8)	ML-CL
				100	98	86	83	66	38	23	27	10	A-4(8)	CL
				100	99	87	84	70	50	39	53	28	A-7-6(18)	CH
				100	94	89	88	69	34	23	32	10	A-4(8)	ML-CL
				100	98	96	95	86	69	58	63	34	A-7-6(20)	CH
				100	89	81	80	72	58	48	56	22	A-7-5(16)	MH
	100	97	93	87	79	70	69	50	25	16	30	7	A-4(7)	ML-CL
				100	96	92	91	82	62	49	63	31	A-7-5(20)	MH-CH
			100	96	92	90	89	81	60	38	36	11	A-6(8)	ML-CL
			100	98	93	90	89	73	47	29	32	8	A-4(8)	ML-CL
					100	99	99	86	61	44	45	21	A-7-6(13)	CL
		100	99	97	94	85	84	65	40	29	35	16	A-6(10)	CL
				100	99	67	63	47	18	14	25	6	A-4(6)	ML-CL
					100	79	75	57	24	20	27	9	A-4(8)	CL
					100	76	73	50	21	16	26	7	A-4(8)	ML-CH
				100	98	91	86	62	25	15	23	5	A-4(8)	ML-CL
				100	99	96	88	68	44	35	43	21	A-7-6(13)	CL
				100	99	96	95	79	59	52	61	32	A-7-6(20)	MH-CH
			100	99	94	91	88	66	25	18	29	7	A-4(8)	ML-CL
				100	99	98	98	91	73	65	74	40	A-7-5(20)	MH-CH
				100	99	98	98	91	76	66	75	39	A-7-5(20)	MH-CH
	100	99	98	96	93	91	89	70	29	23	33	11	A-6(8)	ML-CL
			100	99	97	96	96	83	59	49	59	33	A-7-6(20)	CH
		100	99	97	95	91	90	77	52	47	58	29	A-7-6(19)	MH-CH
				100	94	57	55	44	27	21	35	10	A-4(4)	ML-CL
				100	89	42	42	32	17	14	26	6	A-4(1)	SM-SC
					100	99	99	93	66	42	43	18	A-7-6(12)	ML-CL
				100	99	98	97	92	77	64	62	29	A-7-5(20)	MH-CH
					100	99	99	91	73	58	58	26	A-7-5(18)	MH-CH
				100	99	54	52	43	30	24	27	11	A-6(4)	CL
				100	99	60	60	54	46	42	46	19	A-7-6(9)	ML-CL
				100	99	66	65	58	42	41	41	20	A-7-6(10)	CL
				100	99	55	49	38	25	19	23	8	A-4(4)	CL
					100	75	75	71	61	57	56	27	A-7-6(18)	MH-CH
					100	75	74	72	64	57	63	31	A-7-5(20)	MH-CH
100	99	97	94	91	91	33	32	26	13	11	NP[5]	NP[5]	A-2-4(0)	SM
					100	53	52	49	43	40	44	22	A-7-6(9)	CL
		100	99	96	95	71	70	66	54	45	60	27	A-7-5(18)	MH
				100	95	67	60	40	19	12	24	6	A-4(6)	ML-CL
				100	96	73	73	61	49	47	46	16	A-7-5(11)	ML
	100	98	96	93	86	54	52	45	37	35	45	21	A-7-6(9)	CL

See footnotes on page 102.

[1] Tests performed by Bureau of Public Roads in accordance with standard procedures of the American Association of State Highway Officials (A.A.S.H.O.).

[2] Mechanical analyses according to the American Association of State Highway Officials Designation: T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the A.A.S.H.O. procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 mm. in diameter. In the CS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 mm. in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming texture classes for soils.

[3] The Classification of Soils and Soil-Aggregate Mixtures for Highway Purposes, A.A.S.H.O. Designation: M 145-49.

[4] The Unified Soil Classification System, Technical Memorandum No. 3-357, Vol. 1, Waterways Experiment Station, March 1953.

[5] Nonplastic.

TABLE 30.—*Selected characteristics significant to engineering*

Symbol	Soil	Slope	Engineering classification of soil material below top 8 to 12 inches, parent material, and underlying material	Depth to seasonally high water table	Depth to bedrock	Natural drainage
		Percent		*Feet*	*Feet*	
Aa	Alcoa loam, eroded gently sloping phase.[1]	2 to 5	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from colluvium and local alluvium derived from calcareous sandstone. Bedrock is calcareous sandstone, shale, or limestone.	10 or more....	5 to 25.....	Well drained.
Ab	Alcoa loam, eroded sloping phase	5 to 12				
Ac	Alcoa loam, eroded moderately steep phase.	12 to 25				
Ae	Allen clay loam, severely eroded moderately steep phase.	12 to 25	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from colluvium and local alluvium derived principally from sandstone, slate, and limestone. Bedrock is generally limestone. Stone fragments in the cobbly phases are 2 to 10 inches in diameter.	10 or more....	2 to 25.....	Well drained.
Ah	Allen cobbly fine sandy loam, moderately steep phase.[1]	12 to 25				
Al	Allen cobbly silt loam, moderately steep phase.	12 to 25				
An	Allen fine sandy loam, eroded sloping phase.[1]	5 to 12				
Ao	Allen fine sandy loam, moderately steep phase.	12 to 25				
Ap	Allen silt loam, eroded sloping phase.[1]	5 to 12				
Ar	Allen silt loam, moderately steep phase.	15 to 25				
At	Allen silty clay loam, severely eroded moderately steep phase.	15 to 25				
Ba	Barbourville fine sandy loam, gently sloping phase.[1]	2 to 5	Predominantly ML or CL (A-4 or A-6) soil material developed from colluvium and local alluvium derived from sandstones, quartzites, slates, and shales. Bedrock is chiefly sandstone or slate.	At surface....	2 to 10.....	Well drained.
Bb	Barbourville silt loam, gently sloping phase.[1]	2 to 5				
Bc	Barbourville silt loam, sloping phase.	5 to 12				
Bd	Bland silt loam, sloping phase[1].....	5 to 12	Predominantly MH, CL, or CH (A-6 or A-7) soil material over calcareous mudstone and shaly limestone.	20 or more....	0.8 to 2.....	Well drained to excessively drained.
Be	Bland silt loam, steep phase.....	25 to 50				
Bf	Bland silty clay loam, eroded steep phase.	25 to 50				
Bg	Bruno loamy fine sand[1].....	0 to 3	Predominantly SM (A-2) soil material developed from alluvium derived from sandstone and quartzite. The layers consist of coarse materials ranging from medium sand to fine gravel.	At surface....	10 to 40.....	Excessively drained.
Ca	Christian clay loam, severely eroded sloping phase.	5 to 12	Predominantly MH or CL (A-6 or A-7) soil material over sandy shales.	20 or more....	1 to 4.....	Well drained.
Cb	Christian clay loam, severely eroded moderately steep phase.	12 to 25				
Cc	Christian loam, eroded gently sloping phase.[1]	5 to 12				
Cd	Christian loam, eroded sloping phase.	5 to 12				
Ce	Christian loam, moderately steep phase.	15 to 25				
Cf	Christian loam, eroded moderately steep phase.	12 to 25				

See footnote at end of table.

TABLE 30.—*Selected characteristics significant to engineering*—Continued

Symbol	Soil	Slope	Engineering classification of soil material below top 8 to 12 inches, parent material, and underlying material	Depth to seasonally high water table	Depth to bedrock	Natural drainage
		Percent		*Feet*	*Feet*	
Cg	Colbert silty clay loam, eroded sloping phase.[1]	5 to 12	Predominantly MH, CL, or CH (A-6 or A-7) soil material over clayey limestone.	10 or more....	1 to 3.....	Well drained.
Ch	Cumberland silty clay, severely eroded sloping phase.	5 to 12	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from mixed alluvium derived primarily from limestone. Bedrock is normally limestone.	20 or more....	5 to 20.....	Moderately well drained.
Ck	Cumberland silty clay, severely eroded, moderately steep phase.	12 to 25				
Cl	Cumberland silty clay loam, eroded gently sloping phase.[1]	2 to 5				
Cm	Cumberland silty clay loam, eroded sloping phase.	5 to 12				
Cn	Cumberland silty clay loam, eroded moderately steep phase.	12 to 25				
Da	Dandridge shaly silt loam, very steep phase.	50+	Predominantly MH, CL, or CH (A-6 or A-7) soil material over calcareous shale.	20 or more....	0.5 to 1.5....	Excessively drained to well drained.
Db	Dandridge shaly silty clay loam, eroded moderately steep phase.	12 to 25				
Dc	Dandridge shaly silty clay loam, eroded steep phase.	25 to 50				
Dd	Dandridge silt loam, sloping phase.[1]	5 to 12				
De	Dandridge silt loam, moderately steep phase.	12 to 25				
Df	Dandridge silt loam, steep phase	25 to 50				
Dg	Decatur silty clay, severely eroded sloping phase.	5 to 12	Predominantly MH, CL, or CH (A-7) soil material over limestone.	20 or more....	3 to 18.....	Well drained.
Dh	Decatur silty clay, severely eroded moderately steep phase.	12 to 25				
Dk	Decatur silty clay loam, eroded gently sloping phase.[1]	2 to 5				
Dl	Decatur silty clay loam, eroded sloping phase.	5 to 12				
Dm	Decatur silty clay loam, eroded moderately steep phase.	12 to 25				
Dn	Dewey silt loam, sloping phase.....	5 to 12	Predominantly MH, CL, or CH (A-7) soil material over limestone. Small quantity of fine chert fragments occur in deep subsoil.	20 or more....	4 to 20.....	Well drained.
Do	Dewey silt loam, moderately steep phase.	12 to 25				
Dp	Dewey silty clay, severely eroded sloping phase.	5 to 12				
Dr	Dewey silty clay, severely eroded moderately steep phase.	12 to 25				
Ds	Dewey silty clay loam, eroded gently sloping phase.[1]	2 to 5				
Dt	Dewey silty clay loam, eroded sloping phase.	5 to 12				
Du	Dewey silty clay loam, eroded moderately steep phase.	12 to 25				
Daa	Dunmore silty clay loam, eroded gently sloping phase.	2 to 5	Predominantly MH, CL, or CH (A-6 or A-7) soil material over clayey and sandy dolomitic limestone. A few rock outcrops occur on the steepest slopes.	20 or more....	2 to 10.....	Well drained.
Dab	Dunmore silty clay loam, eroded sloping phase.	5 to 12				
Dac	Dunmore silty clay loam, eroded moderately steep phase.	12 to 25				
Dad	Dunmore silty clay loam, eroded steep phase.	25 to 50				
Dv	Dunmore silt loam, sloping phase.[1]	5 to 12				
Dw	Dunmore silt loam, moderately steep phase.	12 to 25				
Dx	Dunmore silt loam, steep phase.....	25 to 50				
Dy	Dunmore silty clay, severely eroded sloping phase.	5 to 12				
Dz	Dunmore silty clay, severely eroded moderately steep phase.	12 to 25				

See footnote at end of table.

TABLE 30.—*Selected characteristics significant to engineering*—Continued

Symbol	Soil	Slope	Engineering classification of soil material below top 8 to 12 inches, parent material, and underlying material	Depth to seasonally high water table	Depth to bedrock	Natural drainage
		Percent		*Feet*	*Feet*	
Ea	Emory silt loam, level phase	0 to 2	Predominantly ML or CL (A-4, A-6, or A-7) soil material developed from colluvium and local alluvium derived from limestone. Bedrock is generally limestone. Depressions are subject to ponding.	At surface	3 to 12	Well drained.
Eb	Emory silt loam, gently sloping phase.[1]	2 to 6				
Ec	Emory silty clay loam, gently sloping phase.	2 to 5				
Ed	Etowah silt loam, eroded gently sloping phase.[1]	2 to 5	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from mixed alluvium derived principally from limestone materials. Bedrock is generally limestone.	20 or more	5 to 15	Well drained.
Ee	Etowah silt loam, eroded sloping phase.	5 to 12				
Fa	Farragut silty clay, severely eroded sloping phase.	5 to 12	Predominantly MH or CH (A-7) soil material over shaly limestone.	20 or more	2.5 to 5	Well drained.
Fb	Farragut silty clay loam, eroded gently sloping phase.[1]	2 to 5				
Fc	Farragut silty clay loam, eroded sloping phase.	5 to 12				
Fd	Fullerton cherty silt loam, moderately steep phase.[1]	12 to 25	Predominantly MH, CL, or CH (A-6 or A-7) soil material over cherty dolomitic limestone. Chert fragments occur throughout the soil and are normally less than 2 inches in diameter.	20 or more	7 to 20	Well drained.
Fe	Fullerton cherty silt loam, eroded moderately steep phase.	12 to 25				
Ff	Fullerton cherty silt loam, steep phase.	25 to 50				
Fg	Fullerton cherty silt loam, eroded steep phase.	25 to 50				
Ga	Greendale silt loam[1]	1 to 6	Predominantly ML or CL (A-4 or A-6) soil material developed from colluvium and local alluvium derived primarily from cherty limestone. Bedrock is generally limestone.	At surface	4 to 12	Well drained.
Gb	Gullied land, limestone material[1]	10 to 40	Predominantly MH, CL, or CH (A-6 or A-7) soil material over limestone.	20 or more	2 to 20	Well drained.
Gc	Gullied land, shale or sandstone material.[1]	10 to 65	Predominantly MH, CL, or CH (A-6 or A-7) soil material over primarily shale or limestone.	20 or more	0 to 3	Well drained.
Ha	Hamblen loam[1]	0 to 2	Predominantly ML or CL (A-4 or A-6) soil material developed from mixed alluvium derived from shale, slate, sandstone, and limestone. Some areas have beds of gravel and cobbles at depths of 3 feet or more, usually at base of deposit. Notable amounts of sand occur throughout profile along lateral streams that reach into Chilhowee Mountains.	At surface	5 to 12	Imperfectly drained.
Hb	Hamblen silt loam[1]	0 to 2				
Hc	Hamblen silt loam, local alluvium phase.	0 to 3				
Hd	Hayter silt loam, gently sloping phase.[1]	2 to 5	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from colluvium and local alluvium derived from slate and sandstone. Bedrock is generally limestone. The stony phases contain considerable angular and subrounded slate and sandstone fragments, generally 10 inches or more across.	20 or more	5 to 12	Well drained.
He	Hayter silt loam, sloping phase	5 to 12				
Hf	Hayter stony silt loam, gently sloping phase.	2 to 5				
Hg	Hayter stony silt loam, sloping phase.	5 to 12				

See footnote at end of table.

TABLE 30.—*Selected characteristics significant to engineering*—Continued

Symbol	Soil	Slope	Engineering classification of soil material below top 8 to 12 inches, parent material, and underlying material	Depth to seasonally high water table	Depth to bedrock	Natural drainage
		Percent		*Feet*	*Feet*	
Hh	Hermitage silt loam, gently sloping phase.[1]	2 to 5	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from colluvium and local alluvium derived principally from limestone. Bedrock is generally limestone.	10 or more	5 to 12	Well drained.
Hk	Hermitage silt loam, eroded gently sloping phase.	2 to 5				
Hl	Hermitage silt loam, eroded sloping phase.	5 to 12				
Hn	Holston fine sandy loam, eroded sloping phase.[1]	5 to 12	Predominantly ML, MH, or CL (A-4, A-6, or A-7) soil material developed from mixed alluvium derived principally from shale, sandy rocks, and limestone. Bedrock is generally shale.	20 or more	4 to 12	Well drained.
Jc	Jefferson cobbly fine sandy loam, sloping phase.[1]	5 to 12	Predominantly SC, ML, or CL (A-4 or A-6) soil material developed from colluvium and local alluvium derived from sandstone, quartzite, and slate. Bedrock may be shale, slate, or sandstone. Many angular cobbles, 3 to 10 inches in diameter, occur in the cobbly phases.	20 or more	2 to 12	Well drained.
Jd	Jefferson cobbly fine sandy loam, moderately steep phase.	12 to 25				
Je	Jefferson fine sandy loam, gently sloping phase.[1]	2 to 5				
Jf	Jefferson fine sandy loam, eroded sloping phase.	5 to 12				
Jg	Jefferson fine sandy loam, moderately steep phase.	12 to 25				
Jh	Jefferson fine sandy loam, steep phase.	25 to 50				
La	Leadvale silt loam, gently sloping phase.[1]	2 to 5	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from local alluvium derived primarily from shale. Perched water table. Bedrock is generally shale.	2	2 to 10	Moderately well drained.
Lb	Leadvale silt loam, eroded gently sloping phase.	2 to 5				
Lc	Leadvale silt loam, eroded sloping phase.	5 to 12				
Ld	Lehew very fine sandy loam, very steep phase.[1]	45+	Predominantly SM, ML, or CL (A-2 or A-4) soil material over sandstone or shale. Many soft sandstone or shale fragments are mixed with soil material.	20 or more	1 to 2	Excessively drained.
Le	Lindside silt loam[1]	0 to 2	Predominantly ML or CL (A-4 or A-6) soil material developed from alluvium derived from limestone.	At surface	5 to 40	Imperfectly drained.
Lf	Litz shaly silty clay loam, eroded sloping phase.	5 to 12	Predominantly MH, CL, or CH (A-6 or A-7) soil material over shale. Soft shale fragments generally occur throughout the soil and are more numerous in the shaly phases.	20 or more	0.5 to 2	Well drained.
Lg	Litz shaly silty clay loam, eroded moderately steep phase.	12 to 25				
Lh	Litz silt loam, gently sloping phase.	2 to 5				
Lk	Litz silt loam, sloping phase[1]	5 to 12				
Ll	Litz silt loam, moderately steep phase.	12 to 25				
Ma	Melvin silt loam[1]	0 to 2	Predominantly ML, MH, or CL (A-6 or A-7) soil material developed from alluvium derived from limestone.	At surface	5 to 40	Poorly drained.
Mb	Minvale silt loam, eroded gently sloping phase.[1]	2 to 5	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from colluvium and local alluvium derived from cherty dolomitic limestone. Bedrock is dolomitic limestone.	20 or more	5 to 25	Well drained.
Mc	Minvale silt loam, eroded sloping phase.	5 to 12				

See footnote at end of table.

TABLE 30.—*Selected characteristics significant to engineering*—Continued

Symbol	Soil	Slope	Engineering classification of soil material below top 8 to 12 inches, parent material, and underlying material	Depth to seasonally high water table	Depth to bedrock	Natural drainage
		Percent		*Feet*	*Feet*	
Md	Montevallo shaly silt loam, moderately steep phase.[1]	12 to 25	Predominantly GM or GC (A-2 or A-4) soil material containing soft shale fragments; overlies soft silty shale.	20 or more	1 or less	Excessively drained.
Me	Montevallo shaly silt loam, steep phase.	25 to 50				
Mg, Ml	Muse silt loam, eroded moderately steep phase.	12 to 25	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from colluvium and local alluvium derived from slate or shale. Bedrock is generally slate or shale.	20 or more	2 to 8	Well drained.
Mh	Muse silt loam, eroded gently sloping phase.[1]	2 to 5				
Mk	Muse silt loam, eroded sloping phase.	5 to 12				
Na	Neubert loam[1]	0 to 5	Predominantly ML, MH, or CL (A-4, A-6, or A-7) soil material developed from local alluvium derived from calcareous sandstone or shaly sandstone. Bedrock is chiefly limestone, calcareous sandstone, or shale.	0	3 to 12	Well drained.
Pa	Pace silt loam, gently sloping phase.[1]	2 to 5	Predominantly MH, CL, or CH (A-6 or A-7) soil material developed from colluvium and local alluvium derived from cherty limestone. Bedrock is limestone.	20 or more	4 to 12	Moderately well drained.
Pb	Pace silt loam, eroded sloping phase.	5 to 12				
Pc	Prader silt loam[1]	0	Predominantly ML, MH, or CL (A-4, A-6, or A-7) soil material developed from alluvium from shale or slate materials.	At surface	5 to 20	Poorly drained.
Ra	Ramsey slaty silt loam, steep phase.[1]	25 to 50	Predominantly GM or GC (A-2 or A-4) soil material containing soft slate fragments; overlies slate.	20 or more	0 to 1.5	Excessively drained.
Rb	Ramsey slaty silt loam, very steep phase.	50+				
Rc	Ramsey stony fine sandy loam, very steep phase.[1]	50+	Predominantly GM or SM (A-2 or A-4) soil material over quartzite or sandstone. Bedrock outcrops and stones 12 inches or more in diameter are common.	20 or more	1.0 to 1.5	Excessively drained.
Rd	Rockland, limestone, sloping	5 to 12	Predominantly limestone outcrops; some loose limestone fragments.	20 or more	None	Rapid runoff.
Re	Rockland, limestone, moderately steep.	12 to 50				
Rf	Rockland, slate or quartzite, steep.	40 to 75	Slate or quartzite outcrops; loose rock fragments occur in places.	20 or more	None	Rapid runoff.
Sb	Sequatchie fine sandy loam[1]	1 to 3	Predominantly ML or CL (A-4 or A-6) soil material developed from mixed alluvium derived from limestone, sandstone, shale, or slate. The sandy type consists primarily of SC, ML, or CL (A-4 or A-6) soil material and in places contains coarse sand or gravel beds below a depth of 3 feet. Bedrock is chiefly limestone.	0 to 5	6 to 20	Well drained.
Sc	Sequatchie loam[1]	1 to 3				
Sd	Sequatchie silt loam[1]	1 to 3				
Se	Sequoia silty clay, severely eroded sloping phase.	5 to 12	Predominantly MH, CL, or CH (A-6 or A-7) soil material over shale.	20 or more	0.5 to 4	Well drained.
Sf	Sequoia silty clay loam, eroded gently sloping phase.[1]	2 to 5				
Sg	Sequoia silty clay loam, eroded sloping phase.	5 to 12				

See footnote at end of table.

TABLE 30.—*Selected characteristics significant to engineering*—Continued

Symbol	Soil	Slope	Engineering classification of soil material below top 8 to 12 inches, parent material, and underlying material	Depth to seasonally high water table	Depth to bedrock	Natural drainage
		Percent		*Feet*	*Feet*	
Sh	Staser fine sandy loam[1]	0 to 2	Predominantly SM, ML, or CL (A-2, A-4, or A-6) soil material developed from mixed alluvium derived from shale, slate, sandstone, or limestone. Layers of coarser materials occur in places below 1 to 1.5 feet; in the sandy loam, gravelly layers may occur below 2.5 feet.	At surface	5 to 40	Well drained.
Sk	Staser loam	0 to 2				
Sl	Staser silt loam[1]	0 to 2				
Sm	Stony colluvial land	2 to 25	Colluvium that consists predominantly of fragments of quartzite, sandstone, or slate, mixed with silty or sandy soil material; rock fragments are as much as 3 to 4 feet in diameter.	20 or more	3 to 12	Well drained.
Ta	Talbott silt loam, moderately steep phase.	12 to 25	Predominantly MH, CL, or CH (A-7) soil material over clayey limestone.	20 or more	1.5 to 5	Well drained.
Tb	Talbott silty clay, severely eroded sloping phase.	5 to 12				
Tc	Talbott silty clay, severely eroded moderately steep phase.	12 to 25				
Td	Talbott silty clay loam, eroded sloping phase.[1]	5 to 12				
Te	Talbott silty clay loam, eroded moderately steep phase.	12 to 25				
Tf	Talbott-Colbert very rocky silty clay loams, eroded sloping phases.	4 to 12	Predominantly MH, CL, or CH (A-6 or A-7) soil material with numerous limestone outcrops.	20 or more	0 to 3	Well drained.
Tg	Talbott-Colbert very rocky silty clay loams, eroded moderately steep phases.	12 to 30				
Th	Teas loam, steep phase[1]	20 to 45	Approximately 2 feet of predominantly MH, CL, or CH (A-6 or A-7) soil material over interbedded shales and sandstones. Sandstone and shale fragments occupy 10 to 20 percent of the soil mass. The upper 2 feet of bedrock is easily broken with farm equipment.	20 or more	2	Well to excessively drained.
Tl	Tellico clay loam, severely eroded moderately steep phase.	12 to 25	Predominantly MH, CL, or CH (A-6 or A-7) soil material over calcareous sandstone and sandy shales. Bedrock outcrops on steeper slopes.	20 or more	1 to 8	Well drained.
Tm	Tellico clay loam, severely eroded steep phase.	25 to 50				
Tn	Tellico loam, eroded sloping phase.[1]	5 to 12				
To	Tellico loam, eroded moderately steep phase.	12 to 25				
Tp	Tellico loam, steep phase	25 to 50				
Tr	Tellico loam, eroded steep phase	25 to 50				
Ts	Tellico loam, very steep phase	50 to 90				
Wa	Waynesboro loam, eroded gently sloping phase.[1]	2 to 5	Predominantly ML, MH, or CL (A-6 or A-7) soil material developed in mixed alluvium from limestone, shale, and sandstone. Bedrock is generally either limestone or shale.	20 or more	2 to 20	Well drained.
Wb	Waynesboro loam, eroded sloping phase.	5 to 12				
Wc	Waynesboro loam, eroded moderately steep phase.	12 to 25				

See footnote at end of table.

TABLE 30.—*Selected characteristics significant to engineering*—Continued

Symbol	Soil	Slope	Engineering classification of soil material below top 8 to 12 inches, parent material, and underlying material	Depth to seasonally high water table	Depth to bedrock	Natural drainage
		Per cent		*Feet*	*Feet*	
Wd	Whitesburg silt loam, gently sloping phase.[1]	1 to 5	Predominantly ML, MH, or CL (A-4, A-6, or A-7) soil material developed from local alluvium derived from calcareous shale. Bedrock is calcareous shale.	0 to 2	3 to 7	Moderately well drained to imperfectly drained.
We	Whitwell loam[1]	0 to 5	Predominantly MH, CL, or CH (A-6 or A-7) soil material consisting of mixed alluvium derived principally from sandstone.	2 to 3	5 to 20	Imperfectly drained to moderately well drained.

[1] Estimated physical properties of this soil are given in table 31.

usually by sprinkler. The uplands are normally conserved by contour tillage and strip rotations.

Table 32 gives the features that prevent or restrict the construction of drains and ponds. Good drainage is difficult to establish in an area where relatively impervious soil layers or bedrock lie close to the surface. Shallow soil, especially over bedrock, does not permit a good outlet for a drainage ditch or for drain tile. Ditches, however, are more effective than underdrains for draining the soils that have a pan.

The construction of farm ponds is impeded by permeable substrata or bedrock and inadequate or insufficient embankment material. In table 32 the entry "Shallow depth to bedrock" may mean that a small amount of fill material is available; it may also mean a possible seepage plane occurs between bedrock and the soil. A loss of stored water may be the result of a permeable substrata at shallow depth. Where caverns exist in limestone bedrock, the water may escape through the soil layer into the cavernous rock.

Engineering Soil Classification

The engineering classification of a soil material by either the A.A.S.H.O. (*1*) or the Unified (*12*) system identifies that soil material with regard to gradation and plasticity characteristics. The classification permits the engineer to make a rapid appraisal of this soil material through association with more familiar soils having the same classification. The engineering characteristics of soil groups in the A.A.S.H.O. system are shown in table 33. Those of the Unified systems are shown in table 34.

Most highway engineers classify soil materials in accordance with the A.A.S.H.O. method. In this system, soil materials are classified in seven principal groups. The groups range from A-1, consisting of gravelly soils of high bearing capacity, to A-7, consisting of clay soils having low strength when wet. Within each group, the relative engineering value of the soil material is indicated by a group index number. These range from 0 for the best materials to 20 for the poorest. The group index number is shown in parenthesis following the soil group symbol.

Some engineers prefer the Unified soil classification system (*12*). In addition to the description of the materials within each group, table 34 gives some recommendations regarding the use of the soil materials in each group. In this system, soil materials are identified as coarse-grained (8 classes), fine-grained (6 classes), or highly organic.

The engineering classifications of the soil samples tested in the laboratory are shown in the last two columns of table 29. Table 31 gives classifications of the soils that have their profiles described in the subsection, Descriptions of Soils. The classifications given were estimated from soil texture descriptions.

Planning Engineering Soil Surveys

At many construction sites, major soil variations may occur within the depth of proposed excavation and several soil units may be found within a short distance. The soil maps and profile descriptions, as well as the engineering descriptions given in this section, should be used in planning detailed surveys of soils at construction sites. Using the information in the soil survey reports will enable the soils engineer to concentrate on the most suitable soil units. Then a minimum number of soil samples will be required for laboratory testing, and an adequate investigation can be made at a minimum cost.

TABLE 31.—*Estimated physical properties of the soil materials*

Map symbol	Soil or land type[1]	Depth from surface	Classification		Structure	Permeability	Available moisture holding capacity	Suitability as topsoil	Shrink-swell potential	pH
			Unified	A.A.S.H.O.						
		Inches				*Inches per hour*[2]	*Inches per inch*[3]			
Aa	Alcoa loam, eroded gently sloping phase.	0–12	ML or CL	A–4 or A–6	Granular	0.8–2.0	0.15–0.20	Good	Moderate	5.1–6.0
		12–44	MH, CL, or CH	A–6 or A–7	Blocky	.8–2.0	.15–.20	Fair	High	5.1–6.0
		44–60	MH, CL, or CH	A–6 or A–7	Blocky	.8–2.0	.15–.20	Fair	High	5.1–6.0
Ah	Allen cobbly fine sandy loam, moderately steep phase.	0–13	SM or SC	A–2 or A–4	Granular	2.0–10.0	.10–.15	Not suitable	Low	5.1–5.5
		13–19	MH or CL	A–6 or A–7	Subangular blocky	.8–2.0	.10–.15	Not suitable	Moderate	5.1–5.5
		19–42+	SC, MH, or CL	A–7	Blocky	.8–2.0	.10–.15	Not suitable	High	5.1–5.5
An	Allen fine sandy loam, eroded sloping phase.	0–12	SM, SC, or ML	A–2 or A–4	Granular	.8–2.0	.15–.20	Good	Low	5.1–5.5
		12–41	MH or CL	A–6 or A–7	Subangular blocky	.8–2.0	.15–.20	Fair	Moderate	5.1–5.5
		41–60+	MH, CL, or CH	A–6 or A–7	Blocky	.8–2.0	.15–.20	Fair	High	5.1–5.5
Ap	Allen silt loam, eroded sloping phase.	0–7	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Low	5.1–6.0
		7–11	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.1–6.0
		11–50	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.1–6.0
Ba	Barbourville fine sandy loam, gently sloping phase.	0–12	SM, SC, or ML	A–2 or A–4	Granular	2.0–10.0	.15–.20	Good	Low	5.1–6.0
		12–36	ML or CL	A–4 or A–6	Granular	2.0–10.0	.15–.20	Good	Moderate	5.1–6.0
		36+	ML or CL	A–4 or A–6		2.0–10.0	.15–.20	Fair	Moderate	5.1–6.0
Bb	Barbourville silt loam, gently sloping phase.	0–14	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–6.0
		14–30	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.20	Good	Moderate	5.1–6.0
		30–46+	ML or CL	A–6 or A–7		.8–2.0	.15–.20	Fair	Moderate	5.1–6.0
Bd	Bland silt loam, sloping phase.	0–7	ML or CL	A–4 or A–6	Granular	.2–.8	.10–.15	Fair	Moderate	6.1–6.5
		7–20+	MH, CL, or CH	A–6 or A–7		.2–.8	.10–.15	Fair	High	6.1–6.5
Bg	Bruno loamy fine sand	0–14	SM	A–2	Single grained	>10.0	.10–.15	Poor	Low	5.1–6.0
		14+	SM	A–2	Single grained	>10.0	.10–.15	Poor	Low	5.1–6.0
Cc	Christian loam, eroded gently sloping phase.	0–7	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–6.0
		7–12	MH or CL	A–6 or A–7	Granular	.8–2.0	.15–.20	Fair	High	5.1–6.0
		12–38+	MH or CL	A–6 or A–7	Blocky	.8–2.0	.15–.20	Fair	High	5.1–6.0
Cg	Colbert silty clay loam, eroded sloping phase.	0–5	MH, CL, or CH	A–6 or A–7	Granular	.2–.8	.10–.15	Poor	Moderate	5.6–6.0
		5–7	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.10–.15	Poor	High	5.6–6.0
		7–20+	MH, CL, or CH	A–6 or A–7	Massive	<0.2	.10–.15	Not suitable	High	5.6–6.0
Cl	Cumberland silty clay loam, eroded gently sloping phase.	0–14	MH, CL, or CH	A–6 or A–7	Granular	.2–.8	.15–.20	Good	High	5.6–6.0
		14–44	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.6–6.0
		44–60	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.6–6.0
Dd	Dandridge silt loam, sloping phase.	0–7	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	6.1–7.3
		7–17	MH, CL, or CH	A–6 or A–7		.2–.8	.10–.15	Poor	High	6.1–7.3
Dk	Decatur silty clay loam, eroded gently sloping phase.	0–14	MH, CL, or CH	A–6 or A–7	Granular	.2–.8	.10–.20	Good	High	5.1–6.0
		14–20	MH, CL, or CH	A–7	Subangular blocky	.2–.8	.10–.20	Fair	High	5.1–6.0
		20–60+	MH, CL, or CH	A–7	Subangular blocky	.2–.8	.10–.20	Fair	High	5.1–6.0
Ds	Dewey silty clay loam, eroded gently sloping phase.	0–11	MH, CL, or CH	A–7	Granular	.2–.8	.10–.20	Good	High	5.1–6.0
		11–17	MH, CL, or CH	A–7	Subangular blocky	.2–.8	.10–.20	Fair	High	5.1–6.0
		17–60	MH, CL, or CH	A–7	Subangular blocky	.2–.8	.10–.20	Fair	High	5.1–6.0
Dv	Dunmore silt loam, sloping phase.	0–9	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–6.0
		9–13	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.10–.15	Fair	High	5.1–6.0
		13–48+	MH or CH	A–7	Subangular blocky	.2–.8	.05–.10	Poor	High	5.1–6.0

TABLE 31.—*Estimated physical properties of the soil materials*—Continued

Map symbol	Soil or land type[1]	Depth from surface	Classification		Structure	Permeability	Available moisture holding capacity	Suitability as topsoil	Shrink-swell potential	pH
			Unified	A.A.S.H.O.						
		Inches				*Inches per hour*[2]	*Inches per inch*[3]			
Eb	Emory silt loam, gently sloping phase.	0–18	ML or CL	A–4 or A–6	Granular	0.2–.8	0.15–.20	Good	Moderate	5.6–6.0
		18–40+	ML or CL	A–6 or A–7	Granular	.2–.8	.15–.20	Good	Moderate	5.6–6.0
Ed	Etowah silt loam, eroded gently sloping phase.	0–8	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.6–6.0
		8–21	MH, CL, or CH	A–6 or A–7	Blocky	.2–.8	.15–.20	Fair	High	5.6–6.0
		21–45+	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.6–6.0
Fb	Farragut silty clay loam, eroded gently sloping phase.	0–14	MH, CL, or CH	A–6 or A–7	Granular	.2–.8	.15–.20	Good	High	5.6–6.0
		14–28	MH or CH	A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.6–6.0
		28–48+	MH or CH	A–7	Subangular blocky	.2–.8	.10–.15	Poor	High	5.6–6.0
Fd	Fullerton cherty silt loam, moderately steep phase.	0–20	ML or CL	A–4 or A–6	Granular	.2–.8	.10–.15	Poor	Moderate	5.1–5.5
		20–43	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.10–.15	Poor	High	5.1–5.5
		43–60+	MH or CH	A–7	Blocky	.2–.8	.05–.10	Poor	High	5.1–5.5
Ga	Greendale silt loam	0–12	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.6–6.0
		12–30	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.6–6.0
		30–48+	ML or CL	A–4 or A–6		.2–.8	.15–.20	Fair	Moderate	5.6–6.0
Gb	Gullied land, limestone material.					<0.2	.10–.15	Fair to poor		5.1–6.0
Gc	Gullied land, shale and sandstone material.					<0.2	.10–.15	Poor		5.1–6.0
Ha	Hamblen loam	0–16	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.20	Good	Moderate	6.1–6.5
		16–30	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.20	Good	Moderate	6.1–6.5
		30+	ML or CL	A–4 or A–6		.8–2.0	.15–.20	Good	Moderate	6.1–6.5
Hb	Hamblen silt loam	0–15	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	6.1–6.5
		15–36	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	6.1–6.5
		36–48+	ML or CL	A–4 or A–6		.2–.8	.15–.20	Good	Moderate	6.1–6.5
Hd	Hayter silt loam, gently sloping phase.	0–14	ML or CL	A–4 or A–6	Blocky	.8–2.0	.15–.20	Good	Moderate	5.1–6.0
		14–31	MH, CL, or CH	A–6 or A–7	Blocky	.8–2.0	.15–.20	Good to fair	High	5.1–6.0
		31–48	MH, CL, or CH	A–6 or A–7	Blocky	.8–2.0	.15–.20	Fair	High	5.1–6.0
Hh	Hermitage silt loam, gently sloping phase.	0–10	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–6.0
		10–54+	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.1–6.0
Hn	Holston fine sandy loam, eroded sloping phase.	0–8	ML or CL	A–4 or A–6	Crumb	.8–2.0	.15–.20	Good	Low	5.1–5.5
		8–12	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.20	Fair	Moderate	5.1–5.5
		12–48+	MH, CL, or CH	A–6 or A–7	Subangular blocky	.8–2.0	.15–.20	Fair	High	5.1–5.5
Jc	Jefferson cobbly fine sandy loam, sloping phase.	0–9	GM or ML	A–2 or A–4	Crumb	2.0–10.0	.10–.15	Good	Low	5.1–5.5
		9–32	ML or CL	A–4 or A–6	Granular	2.0–10.0	.10–.15	Fair	Moderate	5.1–5.5
		32–48+	ML or CL	A–4 or A–6	Angular blocky	2.0–10.0	.10–.15	Fair	Moderate	5.1–5.5
Je	Jefferson fine sandy loam, gently sloping phase.	0–14	SM or ML	A–2 or A–4	Crumb	.8–2.0	.15–.20	Good	Low	5.1–5.5
		14–34	SC or CL	A–6 or A–7	Granular	.8–2.0	.15–.20	Fair	High	5.1–5.5
		34–54+	SC, MH, CL, or CH	A–6 or A–7	Angular blocky	.8–2.0	.15–.20	Fair	High	5.1–5.5
La	Leadvale silt loam, gently sloping phase.	0–9	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–6.0
		9–22	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.1–6.0
		22–43+	MH, CL, or CH	A–7	Blocky	<0.2	.15–.20	Poor	High	5.1–6.0
Ld	Lehew very fine sandy loam, very steep phase.	0–8	SM or ML	A–2 or A–4	Crumb	.8–2.0	.15–.20	Good	Low	5.1–5.5
		8+	SM, SC, ML, or CL	A–2 or A–4		.8–2.0	.10–.15	Fair	Low	5.1–5.5

TABLE 31.—*Estimated physical properties of the soil materials*—Continued

Map symbol	Soil or land type[1]	Depth from surface	Classification		Structure	Permeability	Available moisture holding capacity	Suitability as topsoil	Shrink-swell potential	pH
			Unified	A.A.S.H.O.						
		Inches				*Inches per hour*[2]	*Inches per inch*[3]			
Le	Lindside silt loam	0–14	ML or CL	A–4 or A–6	Granular	0.2–.8	0.15–.25	Good	Moderate	5.6–6.5
		14–25	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.6–6.5
		25–48+	ML or CL	A–4 or A–6		.2–.8	.15–.20	Good	Moderate	5.6–6.5
Lk	Litz silt loam, sloping phase.	0–7	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–6.0
		7-15+	MH, CL, or CH	A–6 or A–7		.2–.8	.10–.15	Fair	High	5.1–6.0
Ma	Melvin silt loam	0–7	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	6.1–6.5
		7–27	ML, MH, or CL	A–6 or A–7	Granular	.2–.8	.15–.20	Fair	High	6.1–6.5
		27+	ML, MH, or CL	A–6 or A–7		.2–.8	.15–.20	Fair	High	6.1–6.5
Mb	Minvale silt loam, eroded gently sloping phase.	0–16	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–6.0
		16–29	MH, CL, or CH	A–6 or A–7	Blocky	.2–.8	.15–.20	Fair	High	5.1–6.0
		29–48+	MH, CL, or CH	A–6 or A–7	Blocky	.2–.8	.15–.20	Fair	High	5.1–6.0
Md	Montevallo shaly silt loam, moderately steep phase.	0–7	ML or CL	A–4 or A–6	Granular	.2–.8	.10–.15	Fair	Moderate	5.1–5.5
		7+	GM or GC[4]	A–2 or A–4		.2–.8	.10–.15	Fair	Low	5.1–5.5
Mh	Muse silt loam, eroded gently sloping phase.	0–12	ML or CL	A–4 or A–6	Blocky	.2–.8	.15–.20	Good	Moderate	5.1–5.5
		12–28	MH, CL, or CH	A–6 or A–7	Blocky	.2–.8	.15–.20	Fair	High	5.1–5.5
		28–48+	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.1–5.5
Na	Neubert loam	0–15	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.25	Good	Moderate	5.6–6.5
		15–36+	ML, MH, or CL	A–4, A–6, or A–7	Granular	.8–2.0	.15–.25	Good	Moderate	5.6–6.5
Pa	Pace silt loam, gently sloping phase.	0–9	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–6.0
		9–25	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.1–6.0
		25–48	MH, CL, or CH	A–6 or A–7	Massive (structureless).	<0.2	.10–.15	Poor	High	5.1–6.0
Pc	Prader silt loam	0–8	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	6.1–6.5
		8+	ML, MH, or CL	A–4, A–6, or A–7	Granular	.2–.8	.15–.20	Fair	Moderate	6.1–6.5
Ra	Ramsey slaty silt loam, steep phase.	0–9	ML or CL	A–4 or A–6	Granular	.8–2.0	.10–.15	Fair	Moderate	5.6–6.0
		9+	GM or GC[4]	A–2 or A–4	Subangular blocky	.8–2.0	.05–.10	Poor	Low	5.6–6.0
Rc	Ramsey stony fine sandy loam, very steep phase.	0–7	GM or SM	A–2	Granular	2.0–10.0	.10–.15	Not suitable	Low	5.1–5.5
		7+	GM or GC	A–2 or A–4	Subangular blocky	2.0–10.0	.05–.10	Not suitable	Low	5.1–5.5
Rd	Rockland, limestone, sloping.							Not suitable		
Rf	Rockland, slate or quartz, steep.							Not suitable		
Sb	Sequatchie fine sandy loam	0–11	SM, SC, or ML	A–2 or A–4	Granular	2.0–10.0	.15–.20	Good	Low	5.6–6.0
		11–38	SC, ML, or CL	A–4 or A–6	Subangular blocky	.8–2.0	.15–.20	Fair to good	Moderate	5.6–6.0
		38+	SC, ML, or CL	A–4 or A–6		.8–2.0	.15–.20	Fair to good	Moderate	5.6–6.0
Sc	Sequatchie loam	0–12	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.20	Good	Moderate	5.6–6.0
		12–36	ML or CL	A–4 or A–6	Subangular blocky	.8–2.0	.15–.20	Fair to good	Moderate	5.6–6.0
		36+	ML or CL	A–4 or A–6	Subangular blocky	.8–2.0	.15–.20	Fair to good	Moderate	5.6–6.0
Sd	Sequatchie silt loam	0–12	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.6–6.0
		12–36	ML or CL	A–4 or A–6	Blocky	.2–.8	.15–.20	Fair to good	Moderate	5.6–6.0
		36+	ML or CL	A–4 or A–6		.2–.8	.15–.20	Fair to good	Moderate	5.6–6.0

469687—69——8

TABLE 31.—*Estimated physical properties of the soil materials*—Continued

Map symbol	Soil or land type[1]	Depth from surface	Classification		Structure	Permeability	Available moisture holding capacity	Suitability as topsoil	Shrink-swell potential	pH
			Unified	A.A.S.H.O.						
		Inches				*Inches per hour*[2]	*Inches per inch*[3]			
Sf	Sequoia silty clay loam, eroded gently sloping phase.	0–6	ML or CL	A–4 or A–6	Granular	0.2–.8	0.15–.20	Good	Moderate	5.1–6.0
		6–12	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.1–6.0
		12–31+	MH, CL, or CH	A–7	Blocky	.2–.8	.10–.15	Poor	High	5.1–6.0
Sh	Staser fine sandy loam	0–27	SM or ML	A–4	Granular	2.0–10.0	.15–.25	Good	Low	5.6–6.0
		27+	SM, ML, or CL	A–2, A–4, or A–6	Granular	2.0–10.0	.15–.25	Good	Low	5.6–6.0
Sl	Staser silt loam	0–24	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.25	Good	Moderate	6.1–6.5
		24+	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.25	Good	Moderate	6.1–6.5
Sm	Stony colluvial land					>10.0	.00–.10	Not suitable		
Td	Talbott silty clay loam, eroded sloping phase.	0–9	MH, CL, or CH	A–6 or A–7	Granular	.2–.8	.15–.20	Good	High	5.1–6.0
		9–24	MH, CL, or CH	A–7	Subangular blocky	.2–.8	.15–.20	Poor	High	5.1–6.0
		24–42+	MH, CL, or CH	A–7	Blocky	.2–.8	.10–.15	Poor	High	5.1–6.0
Tf	Talbott-Colbert very rocky silty clay loams, eroded sloping phases.					.2–.8	.05–.15	Not suitable		5.1–6.0
Th	Teas loam, steep phase	0–5	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–6.0
		5–16	MH, CL, or CH	A–6 or A–7	Blocky	.2–.8	.15–.20	Fair	High	5.1–6.0
		16+	MH, CL, or CH	A–6 or A–7		.2–.8	.10–.15	Fair	High	5.1–6.0
Tn	Tellico loam, eroded sloping phase.	0–5	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.20	Good	Moderate	5.1–6.0
		5–12	MH, CL, or CH	A–6 or A–7	Subangular blocky	.8–2.0	.15–.20	Fair	High	5.1–6.0
		12–42+	MH, CL, or CH	A–6 or A–7	Subangular blocky	.8–2.0	.15–.20	Fair	High	5.1–6.0
Wa	Waynesboro loam, eroded gently sloping phase.	0–6	ML or CL	A–4 or A–6	Granular	.8–2.0	.15–.20	Good	Moderate	5.1–6.0
		6–40	ML, MH, or CL	A–6 or A–7	Subangular blocky	.8–2.0	.15–.20	Fair	High	5.1–6.0
		40+	MH, CL, or CH	A–7	Subangular blocky	.8–2.0	.15–.20	Fair	High	5.1–6.0
Wd	Whitesburg silt loam, gently sloping phase.	0–14	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.25	Good	Moderate	6.1–7.3
		14–22	ML, MH, or CL	A–4, A–6, or A–7	Granular	.2–.8	.15–.20	Good	Moderate	6.1–7.3
		22–40+	MH, CL, or CH	A–6 or A–7	Granular	.2–.8	.15–.20	Good	High	6.1–7.3
We	Whitwell loam	0–16	ML or CL	A–4 or A–6	Granular	.2–.8	.15–.20	Good	Moderate	5.1–5.5
		16–32	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.1–5.5
		32–50	MH, CL, or CH	A–6 or A–7	Subangular blocky	.2–.8	.15–.20	Fair	High	5.1–5.5

[1] Profiles of most of the soils listed are described in the subsection, Descriptions of Soils.

[2] Number of inches in layer that water will soak into in one hour.

[3] Amount of water in fractions of inch that plants can remove from each inch of soil in layer if moisture of soil is at field capacity.

[4] Slaty or shaly material classified as GM or GC (A-2 or A-4) in-place; may be reduced to ML or CL (A-4 or A-6) by construction operations.

TABLE 32.—*Soil features affecting highway work and conservation work*

[Dashed lines indicate that no unusual problem is expected]

Soil series, soil type, or land type	Highway work				Conservation work	
	Features affecting vertical alignment		Adaptability to earthwork during prolonged wet periods[1]	Suitability as a source of subbase material[2]	Drainage	Farm ponds
	Materials	Drainage				
Alcoa	Bedrock[3]		Not adaptable	Not suitable		
Allen	Bedrock, cobbles in places.		Not adaptable	Fair[4]		
Barbourville	Bedrock	Water table	Fair	Good[4]		Cobbles in places; permeable.
Bland	Bedrock		Not adaptable	Not suitable		Bedrock near surface.
Bruno		Occasionally flooded	Fair	Good		Permeable substratum.
Christian	Bedrock		Not adaptable to poor	Not suitable		
Colbert	Bedrock		Not adaptable	Not suitable	Plastic clay and bedrock near surface.	Bedrock near surface.
Cumberland	Bedrock[3]		Not adaptable	Not suitable		
Dandridge	Bedrock		Not adaptable to poor	Not suitable		Bedrock at shallow depth.
Decatur	Bedrock[3]		Not adaptable	Not suitable		Possible caverns in limestone bedrock.
Dewey	Bedrock[3]		Not adaptable	Not suitable		Possible caverns in limestone bedrock.
Dunmore	Bedrock		Not adaptable	Not suitable		Possible caverns in limestone bedrock.
Emory	Bedrock	Water table	Not adaptable to poor	Not suitable		
Etowah	Bedrock[3]		Not adaptable	Not suitable		
Farragut	Bedrock		Not adaptable	Not suitable		
Fullerton	Bedrock[3]		Not adaptable	Not suitable		Possible caverns in limestone bedrock.
Greendale	Bedrock[3]	Water table; seepage at depth of 1 to 2½ feet.	Not adaptable to poor	Not suitable		
Gullied land, limestone material.	Bedrock		Not adaptable	Not suitable		
Gullied land, shale or sandstone material.	Bedrock		Not adaptable	Not suitable		
Hamblen		Water table; seepage in local alluvium phase at depth of 1 to 2½ feet.	Not adaptable	Poor		
Hayter	Stones		Not adaptable	Not suitable		
Hermitage	Bedrock[3]		Not adaptable	Not suitable		
Holston	Bedrock[3]		Poor	Poor		
Jefferson	Bedrock[3]; cobbles		Fair	Fair		Cobbles in places; permeable.
Leadvale	Bedrock[3]	Water table; seepage at depths of 1 to 2½ feet.	Not adaptable	Not suitable	Firm silty clay at 22 inches.	
Lehew	Bedrock		Insignificant earthwork.	Poor		Shallow to bedrock.
Lindside		Water table	Poor	Not suitable		
Litz	Bedrock		Poor	Not suitable		Shallow to bedrock.
Melvin		Water table	Not adaptable to poor	Poor	Plastic subsoil at shallow depth.	
Minvale			Not adaptable	Not suitable		
Montevallo	Bedrock		Insignificant earthwork.	Not suitable		Shallow to bedrock.
Muse	Bedrock[3]		Not adaptable	Not suitable		
Neubert	Bedrock[3]	Water table; occasionally flooded in places.	Not adaptable to poor	Poor		

TABLE 32.—*Soil features affecting highway work and conservation work*—Continued

Soil series, soil type, or land type	Highway work				Conservation work	
	Features affecting vertical alignment		Adaptability to earthwork during prolonged wet periods[1]	Suitability as a source of subbase material[2]	Drainage	Farm ponds
	Materials	Drainage				
Pace	Bedrock[3]		Not adaptable	Not suitable		
Prader		Water table; occasionally flooded in places.	Not adaptable to poor	Poor	Plastic subsoil at shallow depth.	
Ramsey slaty silt loam.	Bedrock		Insignificant earthwork.	Not suitable		Shallow to bedrock.
Ramsey stony fine sandy loam.	Bedrock		Insignificant earthwork.	Poor (limited)		Shallow to bedrock.
Rockland, limestone	Bedrock		Insignificant earthwork.	Not suitable		Bedrock at surface.
Rockland, shale or quartzite.	Bedrock		Insignificant earthwork.	Not suitable		Bedrock at surface.
Sequatchie		Water table	Not adaptable to poor	Good[4]		Sand and gravel common below depth of 38 inches.
Sequoia	Bedrock		Not adaptable	Not suitable		Shallow to bedrock.
Staser		Occasionally flooded	Not adaptable to poor	Good[4]		Sand and gravel in places below depth of 30 inches.
Stony colluvial land	Bedrock; boulders		Fair	Not suitable		Shallow to bedrock; soil material very pervious.
Talbott	Bedrock		Not adaptable	Not suitable		Shallow to bedrock.
Talbott-Colbert	Bedrock		Insignificant earthwork.	Not suitable		Shallow to bedrock.
Teas	Bedrock		Not adaptable	Not suitable		Shallow to bedrock.
Tellico	Bedrock		Not adaptable	Not suitable		Steep phase is shallow to bedrock.
Waynesboro	Bedrock[3]		Not adaptable	Not suitable		
Whitesburg	Bedrock[3]	Water table; seepage at depths of 1 to 2½ feet.	Not adaptable to poor	Not suitable		
Whitwell	Bedrock[3]	Water table	Not adaptable	Not suitable		

[1] Adaptability refers to soil material; rock excavation may not be affected by prolonged wet periods.

[2] Subbase materials include A-2-4 or better materials; plasticity index should not be greater than 10. Rating based upon soil classification, thickness of deposit, and percentage of large stones.

[3] Depth to bedrock may control location of grade on steeper slopes.

[4] Suitable sandy or gravelly materials are found chiefly in sandy loam soil types.

TABLE 33.—*Classification of soils by American Association of State Highway Officials*[1]

General classification	Granular materials (35 percent or less passing No. 200 sieve)							Silt-clay materials (More than 35 percent passing No. 200 sieve)				
	A–1		A–3	A–2				A–4	A–5	A–6	A–7	
Group classification	A–1–a	A–1–b		A–2–4	A–2–5	A–2–6	A–2–7				A–7–5	A–7–6
Sieve analysis: Percent passing:												
No. 10	50 maximum											
No. 40	30 maximum	50 maximum	51 minimum									
No. 200	15 maximum	25 maximum	10 maximum	35 maximum	35 maximum	35 maximum	35 maximum	36 minimum	36 minimum	36 minimum	36 minimum	36 minimum
Characteristics of fraction passing No. 40 sieve:												
Liquid limit			NP[2]	40 maximum	41 minimum	40 maximum	41 minimum	40 maximum	41 minimum	40 maximum	41 minimum	41 minimum
Plasticity index	6 maximum	6 maximum	NP[2]	10 maximum	10 maximum	11 minimum	11 minimum	10 maximum	10 maximum	11 minimum	11 minimum[3]	11 minimum[3]
Group index	0	0	0	0	0	4 maximum	4 maximum	8 maximum	12 maximum	16 maximum	20 maximum	20 maximum
Usual types of significant constituent materials.	Stone fragments, gravel, and sand.	Stone fragments, gravel, and sand.	Fine sand.	Silty gravel and sand.	Silty gravel and sand.	Clayey gravel and sand.	Clayey gravel and sand.	Nonplastic to moderately plastic silty soils.	Highly elastic silts.	Medium plastic clays.	Highly plastic clays.	Highly plastic clays.
General rating as subgrade—	Excellent to good					Fair to poor						

[1] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (pt. 1; ed. 7): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, A.A.S.H.O. Designation: M 145-49.

[2] NP=nonplastic.

[3] Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30.

TABLE 34.—*Characteristics of soil groups*

Major divisions	Group symbol	Soil description	Value as foundation material[2]	Value as base course directly under bituminous pavement
Coarse-grained soils (*50 percent or less passing No. 200 sieve*):				
Gravels and gravelly soils (*more than half of coarse fraction retained on No. 4 sieve*).	GW	Well-graded gravels and gravel-sand mixtures; little or no fines.	Excellent	Good
	GP	Poorly graded gravels and gravel-sand mixtures; little or no fines.	Good to excellent	Poor to fair
	GM	Silty gravels and gravel-sand-silt mixtures.	Good	Poor to good
	GC	Clayey gravels and gravel-sand-clay mixtures.	Good	Poor
Sands and sandy soils (*more than half of coarse fraction passing No. 4 sieve*).	SW	Well-graded sands and gravelly sands; little or no fines.	Good	Poor
	SP	Poorly graded sands and gravelly sands; little or no fines.	Fair to good	Poor to not suitable
	SM	Silty sands and sand-silt mixtures.	Fair to good	Poor to not suitable
	SC	Clayey sands and sand-clay mixtures.	Fair to good	Not suitable
Fine-grained soils (*more than 50 percent passing No. 200 sieve*):				
Silts and clays (*liquid limit of 50 or less*)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, and clayey silts of slight plasticity.	Fair to poor	Not suitable
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, and lean clays.	Fair to poor	Not suitable
	OL	Organic silts and organic clays having low plasticity.	Poor	Not suitable
Silts and clays (*liquid limit greater than 50*)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, and elastic silts.	Poor	Not suitable
	CH	Inorganic clays having high plasticity and fat clays.	Poor to very poor	Not suitable
	OH	Organic clays having medium to high plasticity and organic silts.	Poor to very poor	Not suitable
Highly organic soils	Pt	Peat and other highly organic soils.	Not suitable	Not suitable

[1] Based on information in The Unified Soil Classification System, Technical Memorandum No. 3-357, Volumes 1, 2, and 3, Waterways Experiment Station, Corps of Engineers, 1953 (*11*). Ratings and ranges in test values are for guidance only. Design should be based on field survey and test of samples from construction site.

[2] Ratings are for subgrade and subbases for flexible pavement.

[3] Determined in accordance with test designation: T 99-49, A.A.S.H.O. (*1*).

[4] Pneumatic-tire rollers may be advisable, particularly when moisture content is higher than optimum.

in Unified Soil Classification System[1]

Value for embankments	Compaction: Characteristics and recommended equipment	Approximate range in A.A.S.H.O. maximum dry density[3]	Field (in-place) CBR	Subgrade modulus, k	Drainage characteristics	Comparable groups in A.A.S.H.O. classification
		Lb./cu. ft.		*Lb./sq. in./in.*		
Very stable; use in pervious shells of dikes and dams.	Good; use crawler-type tractor, pneumatic-tire roller, or steel-wheel roller.	125–135	60–80	300+	Excellent	A–1.
Reasonably stable; use in pervious shells of dikes and dams.	Same	115–125	25–60	300+	Excellent	A–1.
Reaonably stable; not particularly suited to shells, but may be used for impervious cores or blankets.	Good, but needs close control of moisture; use pneumatic-tire or sheepsfoot roller.	120–135	20–80	200–300+	Fair to practically impervious.	A–1 or A–2.
Fairly stable; may be used for impervious core.	Fair, use pneumatic-tire or sheeps-foot roller.	115–130	20–40	200–300	Poor to practically impervious.	A–2.
Very stable; may be used in pervious sections; slope protection required.	Good; use crawler-type tractor or pneumatic-tire roller.	110–130	20–40	200–300	Excellent	A–1.
Reasonably stable; may be used in dike section having flat slopes.	Same	100–120	10–25	200–300	Excellent	A–1 or A–3.
Fairly stable; not particularly suited to shells, but may be used for impervious cores or dikes.	Good, but needs close control of moisture; use pneumatic-tire or sheepsfoot roller.	110–125	10–40	200–300	Fair to practically impervious.	A–1, A–2, or A–4.
Fairly stable; use as impervious core for flood-control structures.	Fair; use pneumatic-tire roller or sheepsfoot roller.	105–125	10–20	200–300	Poor to practically impervious.	A–2, A–4, or A–6.
Poor stability; may be used for embankments if properly controlled.	Good to poor; close control of moisture is essential; use pneumatic-tire or sheepsfoot roller.	95–120	5–15	100–200	Fair to poor	A–4, A–5, or A–6.
Stable; use in impervious cores and blankets.	Fair to good; use pneumatic-tire or sheepsfoot roller.	95–120	5–15	100–200	Practically impervious.	A–4, A–6, or A–7.
Not suitable for embankments.	Fair to poor; use sheepsfoot roller[4].	80–100	4–8	100–200	Poor	A–4, A–5, A–6, or A–7.
Poor stability; use in core of hydraulic fill dam; not desirable in rolled fill construction.	Poor to very poor; use sheepsfoot roller[4].	70–95	4–8	100–200	Fair to poor	A–5 or A–7.
Fair stability on flat slopes; use in thin cores, blankets, and dike sections of dams.	Fair to poor; use sheepsfoot roller[4].	75–105	3–5	50–100	Practically impervious.	A–7.
Not suitable for embankments.	Poor to very poor; use sheepsfoot roller[4].	65–100	3–5	50–100	Practically impervious.	A–5 or A–7.
Not used in embankments, dams, or subgrades for pavements.					Fair to poor	None.

Glossary

Acidity. The degree of acidity of the soil mass expressed in words and pH values as follows:

	pH		pH
Extremely acid	below 4.5	Neutral	6.6-7.3
Very strongly acid	4.5-5.0	Mildly alkaline	7.4-7.8
Strongly acid	5.1-5.5	Moderately alkaline	7.9-8.4
Medium acid	5.6-6.0	Strongly alkaline	8.5-9.0
Slightly acid	6.1-6.5	Very strongly alkaline	9.1 and higher.

Alluvial soils. Azonal group of soils developed from transported and relatively recently deposited material (alluvium) characterized by a weak or no modification of the material by soil-forming processes (*10*).

Alluvium. Fine material, such as sand, mud, or other sediments, deposited on land by streams.

Association, soil. A group of soils with or without common characteristics, geographically associated in an individual pattern.

Bedrock. The solid rock underlying soils.

Catena, soil. A group of soils within one zonal region developed from similar parent material but differing in characteristics of the solum because of differences in relief or drainage.

Chert. A structureless form of silica (SiO_2), very closely related to flint, that breaks into angular fragments. Soils developed from impure limestones containing fragments of chert and having large quantities of these fragments in the soil mass are called cherty soils.

Clay. The small mineral soil grains, less than 0.002 millimeter in diameter. As a soil textural class, soil material that contains 40 percent or more of clay, less than 45 percent of sand, and less than 40 percent of silt.

Colluvium. Mixed deposits of soil material and rock fragments near the base of rather steep slopes. The deposits have accumulated through soil creep, slides, and local wash. Colluvial soils develop from this material.

Consistence. The relative mutual attraction of the particles in the whole soil mass or their resistance to separation or deformation. Consistence is described by such terms as loose or noncoherent, friable, firm, and plastic.

Compact. Combination of firm consistence and close packing of particles.

Firm. Resistant to forces tending to produce rupture or deformation.

Friable. Readily or easily crushed when light to moderate force is applied. Easily crumbled in the fingers.

Plastic. Readily deformed without rupture; pliable but cohesive; readily molded; puttylike.

Erosion. Wearing away or removal of soil by water or wind.

Fertility. Inherent quality of a soil, as measured by its content of compounds needed for proper or balanced growth of plants.

First bottom. Normal flood plain of a stream; land along a stream subject to overflow.

Genesis, soil. Mode of origin of the soil, referring particularly to the processes responsible for the development of the solum from the parent material.

Horizon, soil. A layer or part of the soil profile approximately parallel to the land surface and having more or less well-defined characteristics.

Horizon A. Upper horizon of the soil mass from which material has been removed by percolating waters; the eluviated part of the solum; the surface soil. This horizon is generally divided into two or more subhorizons, of which A_0 is not a part of the mineral soil but is the accumulation of organic debris on the surface. Other subhorizons are designated as A_1, A_2, and so on.

Horizon B. Horizon to which materials have been added by percolating waters; the illuviated part of the solum; the subsoil. This horizon also may be divided into several subhorizons, depending on the color, structure, consistence, and character of the material. These subhorizons are designated as B_1, B_2, and B_3, and so on.

Horizon C. Horizon of partly weathered material underlying the B horizon; the substratum; usually the parent material.

Morphology, soil. The constitution of the soil expressed in the kinds of horizons, their thickness and arrangement in the profile, and their texture, structure, consistence, color, and other chemical and biological properties.

Mottles, soil. Contrasting color patches that vary in number and size. Descriptive terms are as follows: Contrast—*faint, distinct,* and *prominent;* abundance—*few, common,* and *many;* and size—*fine, medium,* and *coarse.* The size measurements are: Fine, commonly less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; medium, commonly ranging between 5 and 15 millimeters (about 0.2 to 0.6 inch) along the greatest dimension; and coarse, commonly more than 15 millimeters along the greatest dimension.

Parent material. The unconsolidated mass from which the soil profile develops. (*See also* Horizon C, Profile, and Substratum.)

Parent rock. The rock from which the parent materials of soils are formed.

Permeable. Easily penetrated by water, air, or plant roots.

Phase, soil. A subdivision of the soil type covering variations within the type that are not sufficient to justify the establishment of a new type, yet are worthy of recognition; a mapping unit. The variations are chiefly in external characteristics such as slope, stoniness, and erosion. (Example: Decatur silty clay loam, eroded sloping phase.)

Productivity. Capability of a soil to produce specified plants under a given system of management.

Profile, soil. Vertical section of the soil from the surface into the parent material.

Reaction. *See* Acidity.

Relief. The elevations or inequalities of the land surface considered collectively.

Residual material. Soil material that has weathered or developed in place. Material that has not been moved.

Series, soil. A group of soils closely similar in all respects except the texture of the surface soil.

Soil. The natural medium for the growth of land plants. A natural body on the surface of the earth in which plants grow, composed of organic and mineral materials and living forms.

Solum. The upper part of the profile, above the parent material, in which the processes of soil formation are active.

Structure, soil. The aggregate in which the individual soil grains are arranged. Such terms as crumb, granular, platy, prismatic, columnar, angular, subangular, and blocky are used to describe soil structure.

Subsoil. Technically, the B horizon; commonly, that part of the profile below plow depth.

Substratum. Material underlying the subsoil. (*See also* Horizon C and Parent material.)

Surface soil. Technically, the A horizon. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil; about 5 to 8 inches in thickness.

Terrace (geologic). Old alluvial plain. Usually occurs near a stream.

Texture, soil. The relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, it refers to the proportions of sand, silt, and clay. A coarse-textured soil is one with a high sand content; a fine-textured soil has a large proportion of clay.

Type. A subdivision of the soil series based on the texture of the surface soil.

Upland (geologic). Land consisting of material unworked by water in recent geologic time and ordinarily lying at higher elevations than the alluvial plains or stream terraces.

Literature Cited

(1) AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS.
1955. STANDARD SPECIFICATIONS FOR HIGHWAYS MATERIALS AND METHODS OF SAMPLING AND TESTING. Ed. 7, 2 vols., illus., Washington, D. C.

(2) AUTEN, JOHN T.
1933. POROSITY AND WATER ABSORPTION OF FOREST SOILS. U. S. Dept. Agr., Jour. Agr. Research 46: 997-1014, illus.

(3) BORST, HAROLD L., MCCALL, A. G., BELL, F. G.
1945. INVESTIGATIONS IN EROSION CONTROL AND RECLAMATION OF ERODED LAND. U. S. Dept. Agr., Tech. Bul. 888, 95 pp., illus.

(4) COPLEY, T. L., FORREST, LUKE A., MCCALL, A. G., BELL, F. G.
1944. INVESTIGATIONS IN EROSION CONTROL AND RECLAMATION OF ERODED LAND. U. S. Dept. Agr., Tech. Bul. 873, 66 pp., illus.

(5) DEN UYL, D., AND DAY, R. K.
1934. WOODLAND CARRYING CAPACITIES AND GRAZING INJURY STUDIES. Indiana Agr. Expt. Sta. Bul. 391, 12 pp., illus.

(6) FENNEMAN, N. M.
1938. PHYSIOGRAPHY OF EASTERN UNITED STATES. 714 pp., illus. New York and London.

(7) FOSTER, A. P.
1923. COUNTIES OF TENNESSEE. Tennessee Dept. of Education, Div. of History, 124 pp.

(8) THORPE, J., AND SMITH, G. D.
1949. HIGHER CATEGORIES OF SOIL CLASSIFICATION. Soil Sci. 67: 117-126.

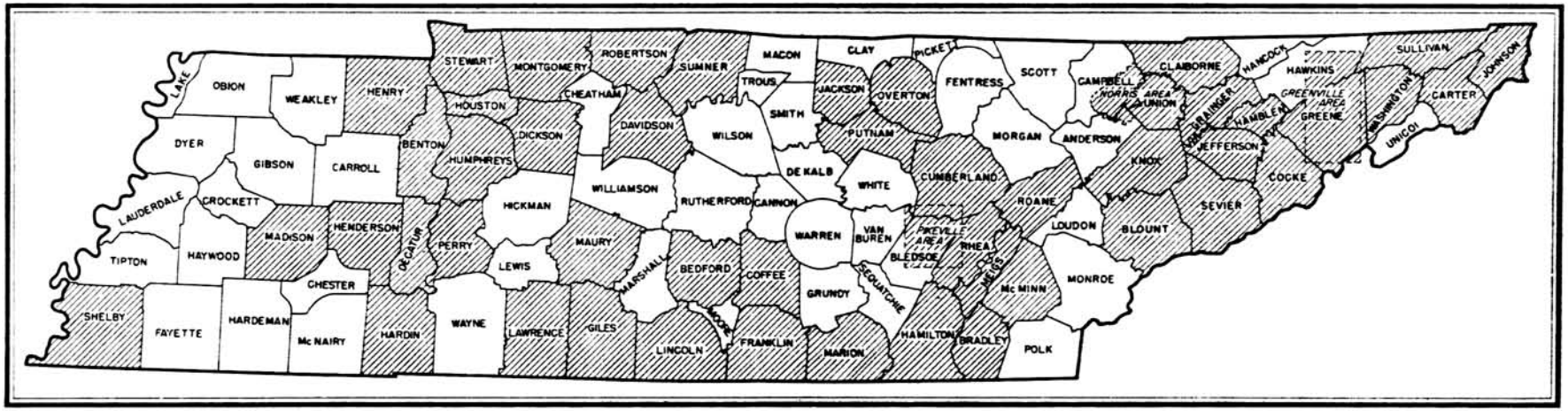
(9) UNITED STATES GEOLOGICAL SURVEY.
1895. GEOLOGICAL ATLAS OF THE UNITED STATES, KNOXVILLE FOLIO, TENNESSEE. Folio 16, [6] pp., illus.

(10) UNITED STATES DEPARTMENT OF AGRICULTURE.
1938. SOILS AND MEN. U. S. Dept. Agr. Yearbook 1938, 1232 pp., illus.

(11) ———
1951. SOIL SURVEY MANUAL. U. S. Dept. Agr. Handbook 18, 503 pp., illus.

(12) WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS.
1953. THE UNIFIED SOIL CLASSIFICATION SYSTEM. Tech. Memo No. 3-357, 3 vols. Vicksburg, Miss.

* U.S. GOVERNMENT PRINTING OFFICE: 1959—469687



Areas surveyed in Tennessee shown by shading.

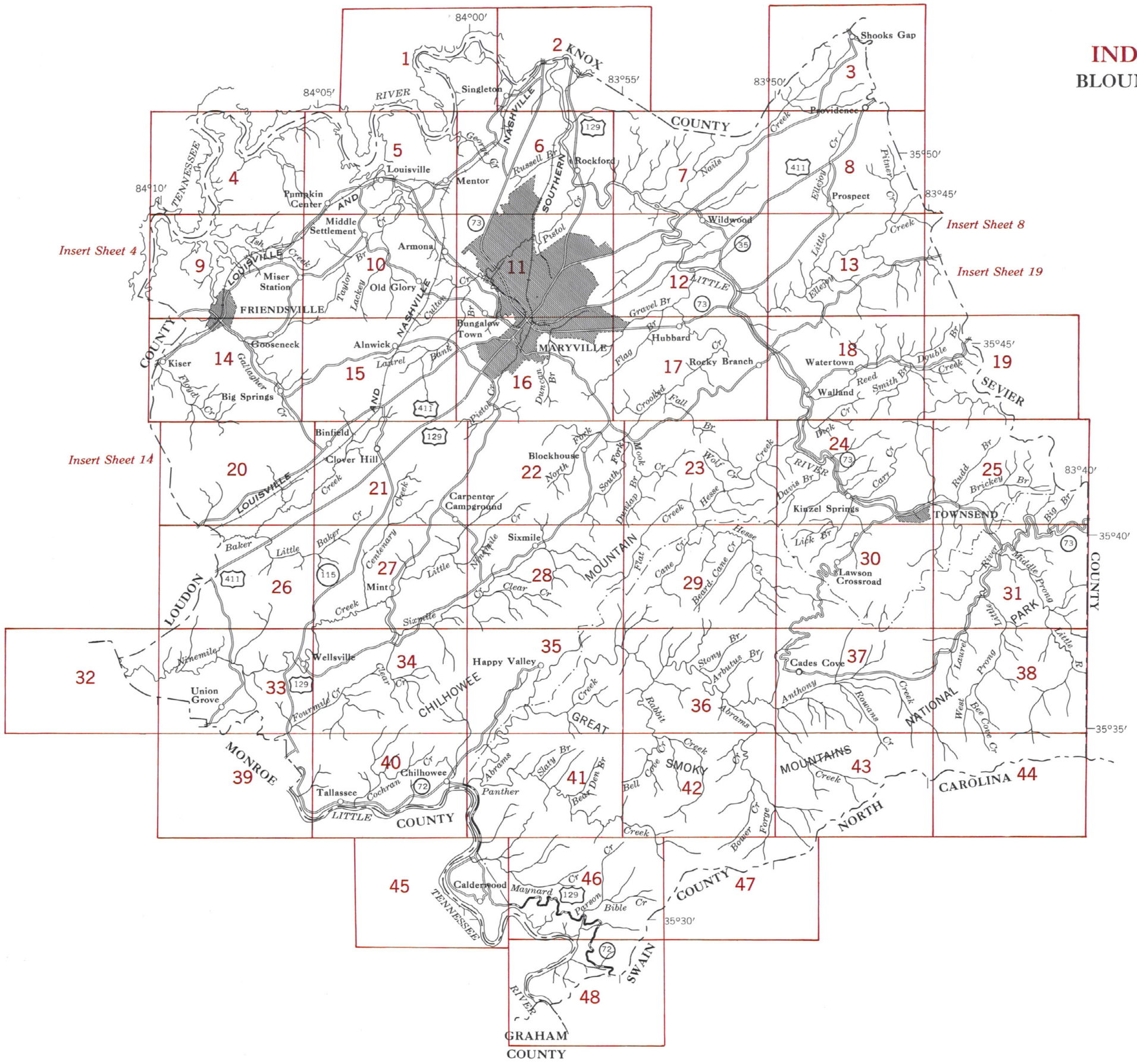
Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457–3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all of its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, political beliefs, genetic information, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write to USDA, Assistant Secretary for Civil Rights, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, S.W., Stop 9410, Washington, DC 20250-9410, or call toll-free at (866) 632–9992 (English) or (800) 877–8339 (TDD) or (866) 377–8642 (English Federal-relay) or (800) 845–6136 (Spanish Federal-relay). USDA is an equal opportunity provider and employer.

INDEX TO MAP SHEETS
BLOUNT COUNTY, TENNESSEE



SOILS LEGEND

SYMBOL	NAME
Aa	Alcoa loam, eroded gently sloping phase
Ab	Alcoa loam, eroded sloping phase
Ac	Alcoa loam, eroded moderately steep phase
Ae	Allen clay loam, severely eroded moderately steep phase
Ah	Allen cobbly fine sandy loam, moderately steep phase
Al	Allen cobbly silt loam, moderately steep phase
An	Allen fine sandy loam, eroded sloping phase
Ao	Allen fine sandy loam, moderately steep phase
Ap	Allen silt loam, eroded sloping phase
Ar	Allen silt loam, moderately steep phase
At	Allen silty clay loam, severely eroded moderately steep phase
Ba	Barbourville fine sandy loam, gently sloping phase
Bb	Barbourville silt loam, gently sloping phase
Bc	Barbourville silt loam, sloping phase
Bd	Bland silt loam, sloping phase
Be	Bland silt loam, steep phase
Bf	Bland silty clay loam, eroded steep phase
Bg	Bruno loamy fine sand
Ca	Christian clay loam, severely eroded sloping phase
Cb	Christian clay loam, severely eroded moderately steep phase
Cc	Christian loam, eroded gently sloping phase
Cd	Christian loam, eroded sloping phase
Ce	Christian loam, moderately steep phase
Cf	Christian loam, eroded moderately steep phase
Cg	Colbert silty clay loam, eroded sloping phase
Ch	Cumberland silty clay, severely eroded sloping phase
Ck	Cumberland silty clay, severely eroded moderately steep phase
Cl	Cumberland silty clay loam, eroded gently sloping phase
Cm	Cumberland silty clay loam, eroded sloping phase
Cn	Cumberland silty clay loam, eroded moderately steep phase
Da	Dandridge shaly silt loam, very steep phase
Db	Dandridge shaly silty clay loam, eroded moderately steep phase
Dc	Dandridge shaly silty clay loam, eroded steep phase
Dd	Dandridge silt loam, sloping phase
De	Dandridge silt loam, moderately steep phase
Df	Dandridge silt loam, steep phase
Dg	Decatur silty clay, severely eroded sloping phase
Dh	Decatur silty clay, severely eroded moderately steep phase
Dk	Decatur silty clay loam, eroded gently sloping phase
Dl	Decatur silty clay loam, eroded sloping phase
Dm	Decatur silty clay loam, eroded moderately steep phase
Dn	Dewey silt loam, sloping phase
Do	Dewey silt loam, moderately steep phase
Dp	Dewey silty clay, severely eroded sloping phase
Dr	Dewey silty clay, severely eroded moderately steep phase
Ds	Dewey silty clay loam, eroded gently sloping phase
Dt	Dewey silty clay loam, eroded sloping phase
Du	Dewey silty clay loam, eroded moderately steep phase
Dv	Dunmore silt loam, sloping phase
Dw	Dunmore silt loam, moderately steep phase
Dx	Dunmore silt loam, steep phase
Dy	Dunmore silty clay, severely eroded sloping phase
Dz	Dunmore silty clay, severely eroded moderately steep phase
Daa	Dunmore silty clay loam, eroded gently sloping phase
Dab	Dunmore silty clay loam, eroded sloping phase
Dac	Dunmore silty clay loam, eroded moderately steep phase
Dad	Dunmore silty clay loam, eroded steep phase
Ea	Emory silt loam, level phase
Eb	Emory silt loam, gently sloping phase
Ec	Emory silty clay loam, gently sloping phase
Ed	Etowah silt loam, eroded gently sloping phase
Ee	Etowah silt loam, eroded sloping phase
Fa	Farragut silty clay, severely eroded sloping phase
Fb	Farragut silty clay loam, eroded gently sloping phase
Fc	Farragut silty clay loam, eroded sloping phase
Fd	Fullerton cherty silt loam, moderately steep phase
Fe	Fullerton cherty silt loam, eroded moderately steep phase
Ff	Fullerton cherty silt loam, steep phase
Fg	Fullerton cherty silt loam, eroded steep phase
Ga	Greendale silt loam
Gb	Gullied land, limestone material
Gc	Gullied land, shale or sandstone material
Ha	Hamblen loam
Hb	Hamblen silt loam
Hc	Hamblen silt loam, local alluvium phase

SYMBOL (continued)	NAME
Hd	Hayter silt loam, gently sloping phase
He	Hayter silt loam, sloping phase
Hf	Hayter stony silt loam, gently sloping phase
Hg	Hayter stony silt loam, sloping phase
Hh	Hermitage silt loam, gently sloping phase
Hk	Hermitage silt loam, eroded gently sloping phase
Hl	Hermitage silt loam, eroded sloping phase
Hn	Holston fine sandy loam, eroded sloping phase
Jc	Jefferson cobbly fine sandy loam, sloping phase
Jd	Jefferson cobbly fine sandy loam, moderately steep phase
Je	Jefferson fine sandy loam, gently sloping phase
Jf	Jefferson fine sandy loam, eroded sloping phase
Jg	Jefferson fine sandy loam, moderately steep phase
Jh	Jefferson fine sandy loam, steep phase
La	Leadvale silt loam, gently sloping phase
Lb	Leadvale silt loam, eroded gently sloping phase
Lc	Leadvale silt loam, eroded sloping phase
Ld	Lehew very fine sandy loam, very steep phase
Le	Lindside silt loam
Lf	Litz shaly silty clay loam, eroded sloping phase
Lg	Litz shaly silty clay loam, eroded moderately steep phase
Lh	Litz silt loam, gently sloping phase
Lk	Litz silt loam, sloping phase
Ll	Litz silt loam, moderately steep phase
Ma	Melvin silt loam
Mb	Minvale silt loam, eroded gently sloping phase
Mc	Minvale silt loam, eroded sloping phase
Md	Montevallo shaly silt loam, moderately steep phase
Me	Montevallo shaly silt loam, steep phase
Mh	Muse silt loam, eroded gently sloping phase
Mk	Muse silt loam, eroded sloping phase
Mg & Ml	Muse silt loam, eroded moderately steep phase
Na	Neubert loam
Pa	Pace silt loam, gently sloping phase
Pb	Pace silt loam, eroded sloping phase
Pc	Prader silt loam
Ra	Ramsey slaty silt loam, steep phase
Rb	Ramsey slaty silt loam, very steep phase
Rc	Ramsey stony fine sandy loam, very steep phase
Rd	Rockland, limestone, sloping
Re	Rockland, limestone, moderately steep
Rf	Rockland, slate or quartzite, steep
Sb	Sequatchie fine sandy loam
Sc	Sequatchie loam
Sd	Sequatchie silt loam
Se	Sequoia silty clay, severely eroded sloping phase
Sf	Sequoia silty clay loam, eroded gently sloping phase
Sg	Sequoia silty clay loam, eroded sloping phase
Sh	Staser fine sandy loam
Sk	Staser loam
Sl	Staser silt loam
Sm	Stony colluvial land
Ta	Talbott silt loam, moderately steep phase
Tb	Talbott silty clay, severely eroded sloping phase
Tc	Talbott silty clay, severely eroded moderately steep phase
Td	Talbott silty clay loam, eroded sloping phase
Te	Talbott silty clay loam, eroded moderately steep phase
Tf	Talbott-Colbert very rocky silty clay loams, eroded sloping phases
Tg	Talbott-Colbert very rocky silty clay loams, eroded moderately steep phases
Th	Teas loam, steep phase
Tl	Tellico clay loam, severely eroded moderately steep phase
Tm	Tellico clay loam, severely eroded steep phase
Tn	Tellico loam, eroded sloping phase
To	Tellico loam, eroded moderately steep phase
Tp	Tellico loam, steep phase
Tr	Tellico loam, eroded steep phase
Ts	Tellico loam, very steep phase
Wa	Waynesboro loam, eroded gently sloping phase
Wb	Waynesboro loam, eroded sloping phase
Wc	Waynesboro loam, eroded moderately steep phase
Wd	Whitesburg silt loam, gently sloping phase
We	Whitwell loam

Soils surveyed 1950-1952 by Joe A. Elder and S. R. Bacon, U. S. Department of Agriculture; and T. R. Love, Robbie L. Flowers, Joseph A. Phillips, George W. Thompson, and D. A. Tucker, Tennessee Agricultural Experiment Station.
Correlation by Max J. Edwards, U. S. Department of Agriculture.

Soil map constructed 1958 by Cartographic Division, Soil Conservation Service, USDA, from 1953 aerial photographs. Controlled mosaic based on polyconic projection, 1927 North American datum.

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Roads
- Good motor
- Poor motor
- Trail
- Marker, U. S. (33)

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferry
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station

Mine and Quarry
- Shaft
- Dump
- Prospect
- Pits, gravel or other

Power line

Pipeline

Cemetery

Dam

Levee

Tank

Oil well

Airway beacon

Canal lock (point upstream)

BOUNDARIES

- National or state
- County
- Township, civil
- Township, U. S.
- Section line, corner
- City (corporate)
- Reservation
- Land grant

DRAINAGE

Streams
- Perennial
- Intermittent, unclass.
- Crossable with tillage implements
- Not crossable with tillage implements

Canals and ditches (CANAL / DITCH)

Lakes and ponds
- Perennial
- Intermittent

Wells (flowing)

Springs

Marsh

Wet spot

RELIEF

Escarpments
- Bedrock
- Other

Prominent peaks

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil type outline and symbol (Dx)
- Gravel
- Stones or cobbles
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land

Erosion
- Uneroded spot (u)
- Sheet, moderate (s)
- Sheet, severe (ss)
- Gully, moderate (g)
- Gully, severe (gg)
- Sheet and gully, moderate (sg)
- Wind, moderate
- Wind, severe
- Blowout
- Wind hummock
- Overblown soil

Gullies

Areas of alkali and salts (A / M / S)
- Strong
- Moderate
- Slight

Free of toxic effect (F)

Sample location (● 26)

Saline spot (+)

N

KNOX COUNTY

TENNESSEE RIVER

LITTLE FORT LOUDOUN RESERVOIR

RIVER

Beaty Hollow

DISTRICT II

ROCKFORD

Old Ballards Church

Ellejoy Bay

(Sheet 2)

(Sheet 5)

(Sheet 6)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(2)

N

(Sheet 1)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 6) | (Sheet 7)

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

N

Shooks Gap

Nails Creek

Nails Creek

KNOX COUNTY

SEVIER COUNTY

DISTRICT 13

UCEBA

Providence

(Sheet 7) (Sheet 8)

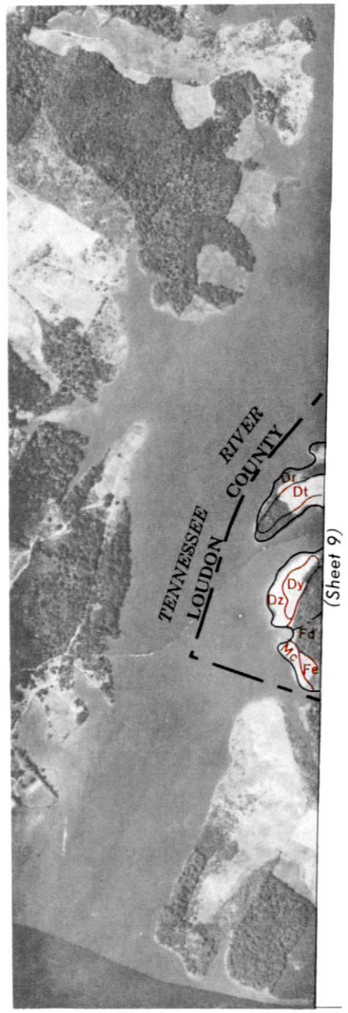
0 ½ 1 Mile

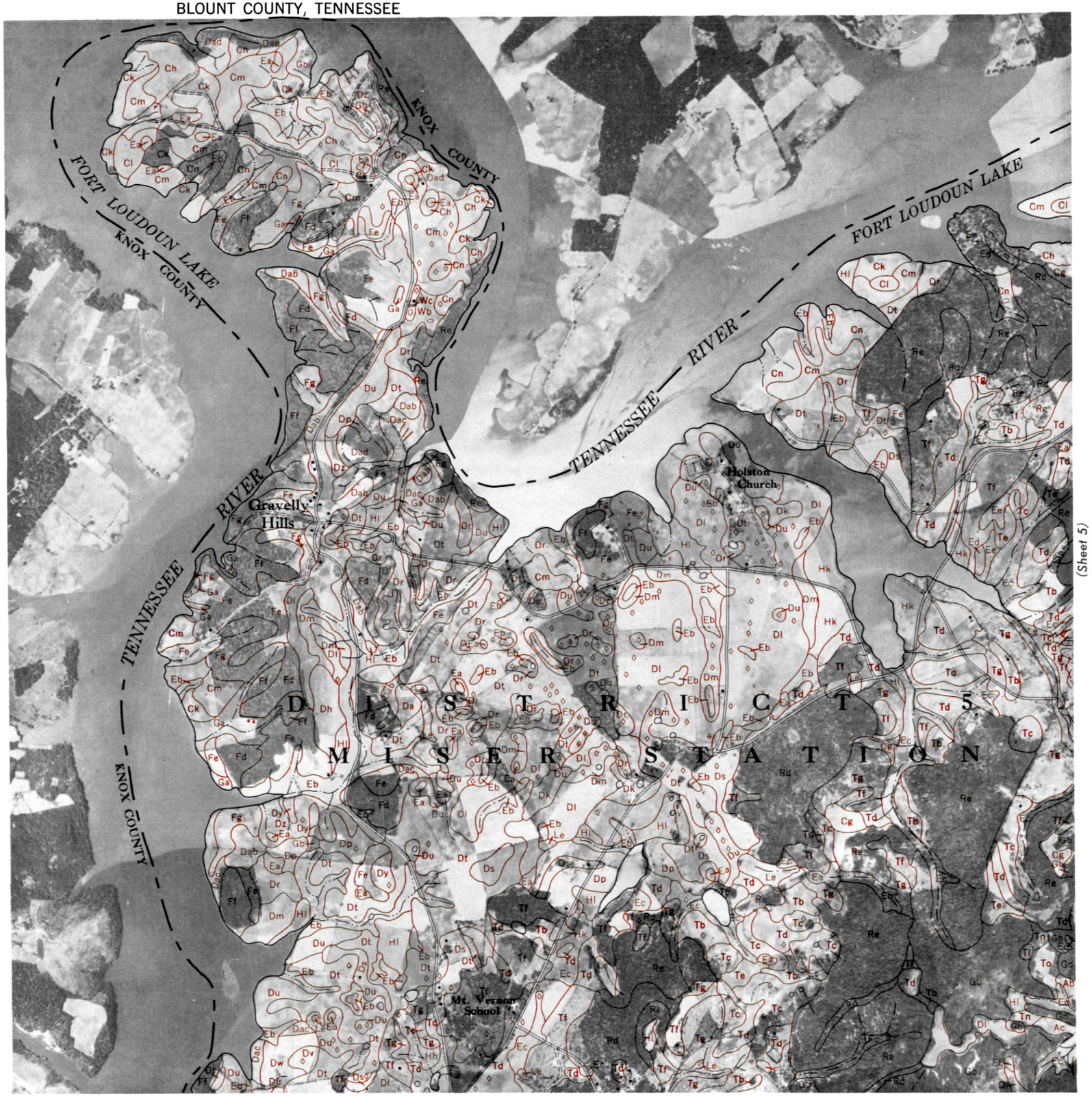
Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

N





(Sheet 9)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

N

(Sheet 4)

(Sheet 6)

DISTRICT 5
MISER STATION

DISTRICT 10
LOUISVILLE

TENNESSEE RIVER

KNOX COUNTY

LOUDOUN COUNTY

RESERVOIR

FORT

Open Door Cemetery

Louisville

Carlton

Mentor

Pumpkin Center

NASHVILLE AND LOUISVILLE

KNOXVILLE MUNICIPAL (MC GHEE-TYSON) AIRPORT

Scale 1:20000

0 ½ 1 Mile

0 5000 Feet

(Sheet 10)

BLOUNT COUNTY, TENNESSEE

6

(Sheet 1) (Sheet 2)

N

(Sheet 5)

(Sheet 7)

(Sheet 11)

Kit Carson School

FORT LOUDOUN LAKE

Chandler

Mimosa Heights

Russel Cemetery

Chandler Spring

Rockford Station

Rockford

Rockford School

Zion Church

KNOXVILLE MUNICIPAL (MC GHEE-TYSON) AIRPORT

ALCOA ALUMINUM COMPANY (NORTH PLANT)

DISTRICT 10 LOUISVILLE

DISTRICT 9 MARYVILLE

DISTRICT 11 CROSSROADS

DISTRICT 12 WILDWOOD

NASHVILLE

LOUISVILLE

GEORGE

LITTLE RIVER

SOUTHERN

Creek

Branch

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 2)

7

N

DISTRICT 11
ROCKFORD

KNOX COUNTY

KNOX COUNTY

Cedar Grove Church

Nails Creek

Central Point Church

Hollybrook Branch

DISTRICT 12
WILDWOOD

DISTRICT 13
UCEBA

LITTLE RIVER

LITTLE RIVER

Brakebell Island

Wildwood

(Sheet 6)

(Sheet 8)

(Sheet 12)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 3)

N

(Sheet 7)

DISTRICT 13

Community School

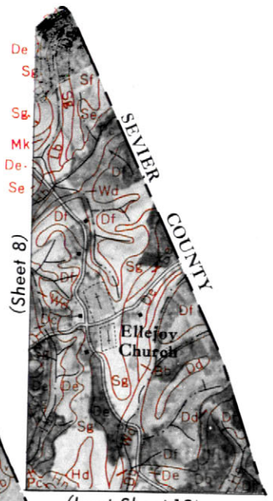
Eusebia Church

Prospect

Ellejoy Church

Primer Creek

SEVIER COUNTY



(Inset Sheet 19)

(Sheet 8)

(Sheet 13)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Inset)

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 4)

N

TENNESSEE RIVER

KNOX COUNTY

LOUDON COUNTY

FORT LOUDOUN RESERVOIR

FORT LOUDOUN RESERVOIR

DISTRICT 5

MISER STATION

DISTRICT 4

MISER STATION

Ish Cemetery

Moralfa

Mahoney Mill

Miser Station

NASHVILLE AND LOUISVILLE

FRIENDSVILLE

Approximate LOUDON COUNTY (Boundary)

(Insert on Sheet 4)

(Sheet 10)

(Sheet 14)

0 ½ 1 Mile

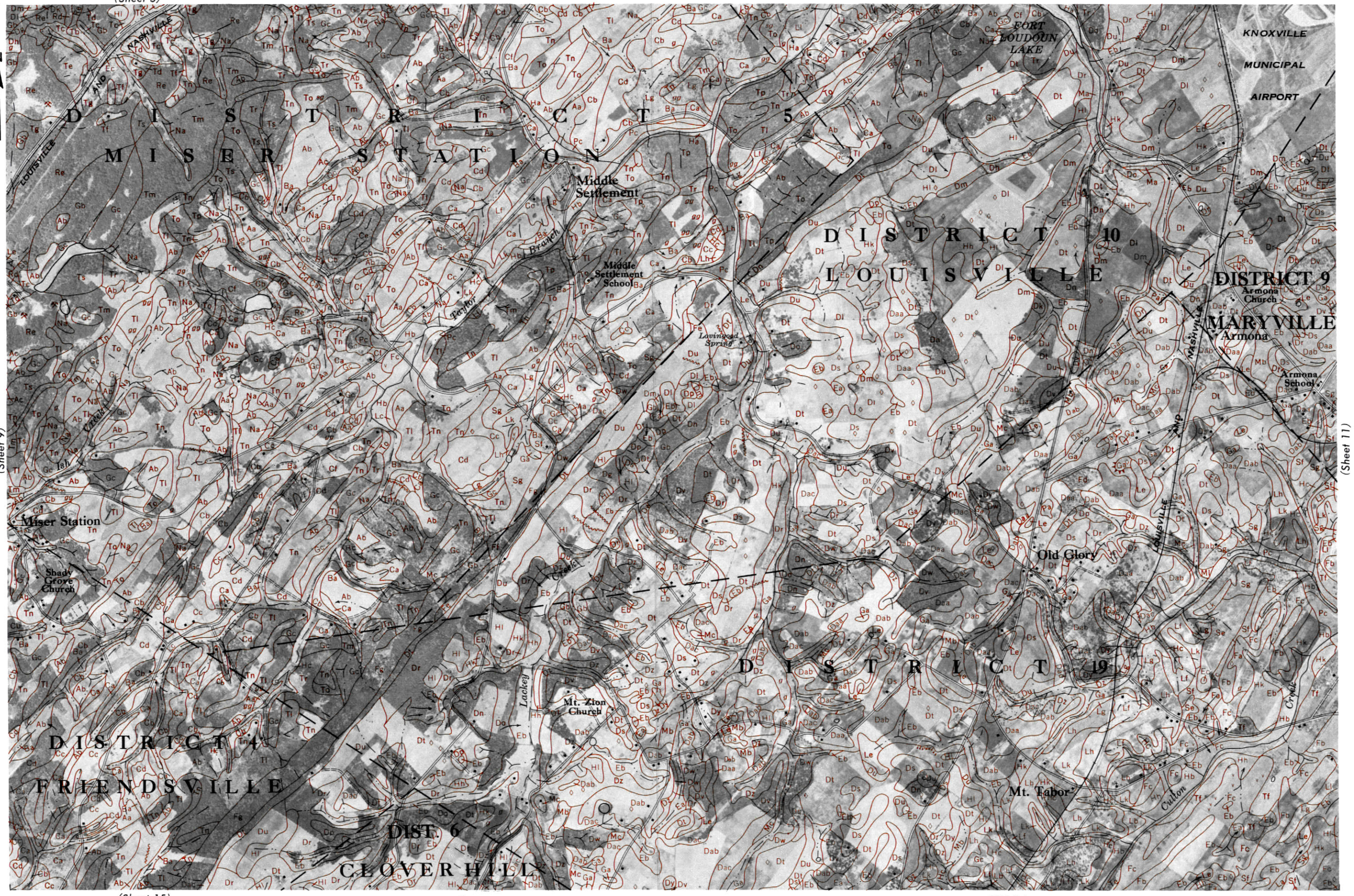
Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 5)

N



(Sheet 9)

(Sheet 11)

(Sheet 15)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 6)

11

DIST. 10

DIST. 11

N

KNOXVILLE MUNICIPAL (MC GHEE-TYSON) AIRPORT

Duncan

Duncan Creek

Pistol Creek

DISTRICT 9

MARYVILLE

Pedford Branch

Culton Creek

LOUISVILLE AND NASHVILLE

SOUTHERN

Brumble Creek

ALCOA

ALCOA ALUMINUM COMPANY (SOUTH PLANT)

DISTRICT 19

East Maryville Church

Wilder Chapel

MARYVILLE

(Sheet 10)

(Sheet 12)

(Sheet 16)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

N

(Sheet 11)

(Sheet 13)

(Sheet 17)

DISTRICT 9
MARYVILLE

DISTRICT 13
UCEBA

DISTRICT 12
DALSTRICT
WILDWOOD

DISTRICT 14
PERRYSMILL

Wildwood

Mt. Lebanon Church

Blount Beach

Centennial Church

Pleasant Grove Church

LITTLE RIVER

Little River

Pistol Creek

Ellejoy Creek

Peppermint Branch

Gravel Branch

Flag Branch

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 8)

N

(Sheet 12)

(Inset, sheet 19)

DISTRICT 13

DISTRICT 14

PERRY SMILL

Little River

Eagle Creek

Ellejoy

Green

Ellejoy

Creek

Ellejoy

CHILHOWEE MOUNTAIN

DIST 18

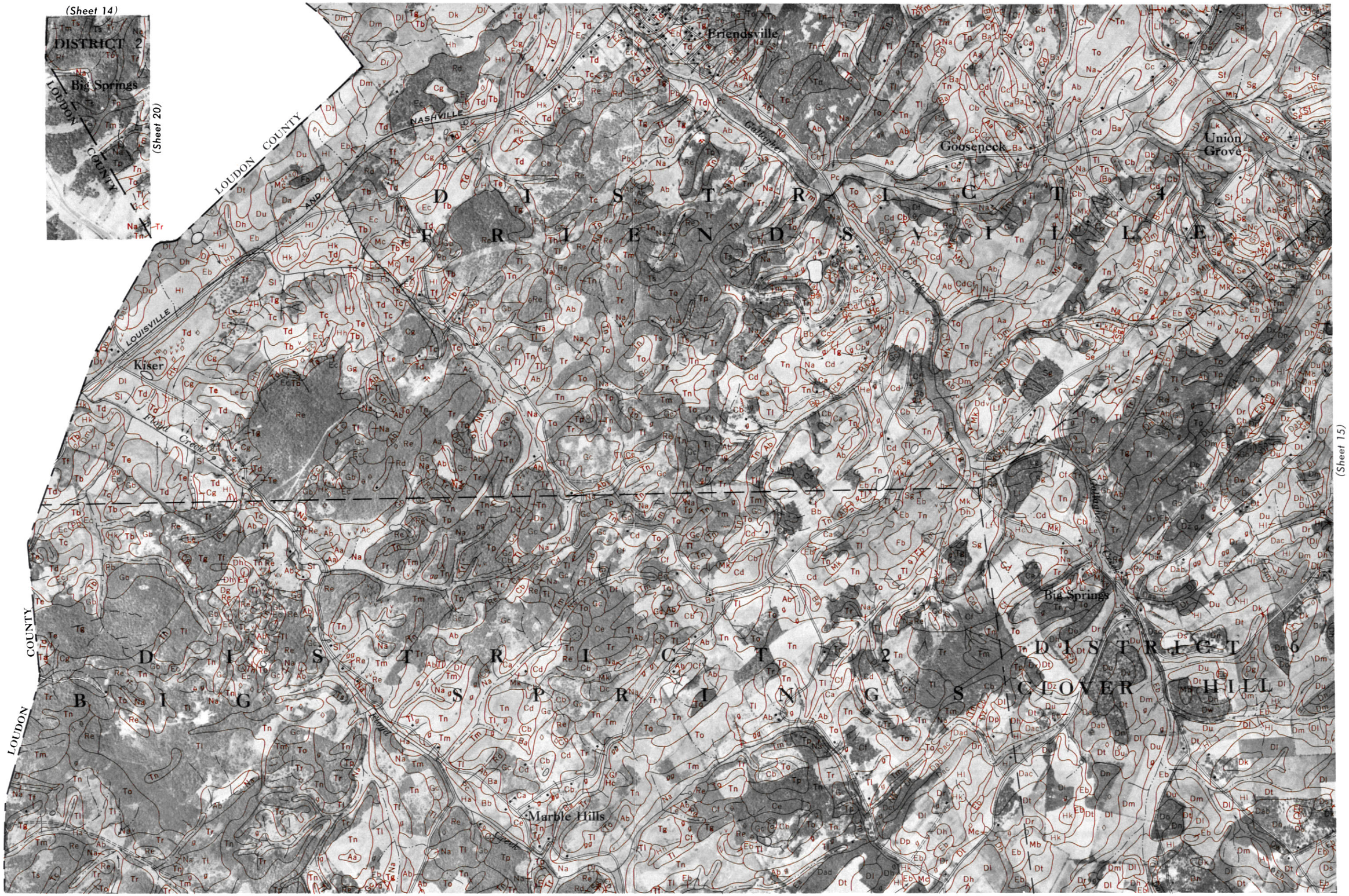
(Sheet 18)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE



0 ½ 1 Mile

Scale 1:20 000

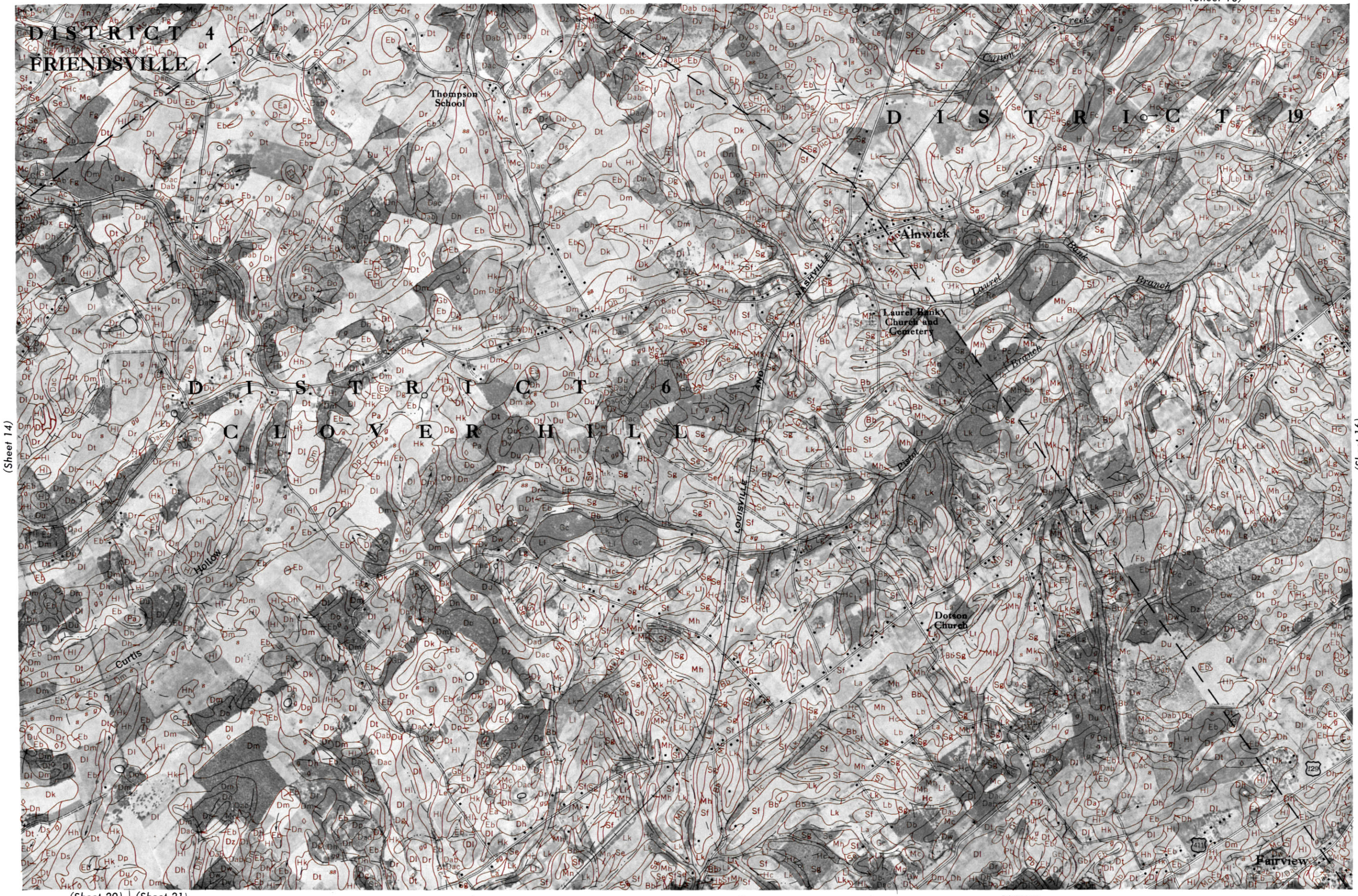
0 5 000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 10)

(Sheet 14)

(Sheet 16)



(Sheet 20)

(Sheet 21)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 11)

N

(Sheet 15)

(Sheet 17)

(Sheet 21) | (Sheet 22)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 12)

N

DISTRICT 9
MARYVILLE

DIST. 12

Hubbard

Hubbard School

DISTRICT 11
PERRYS MILL

DISTRICT 8
CROOKED CREEK

Pine Level Church

Law Chapel School

Rocky Branch

CHILHOWEE MOUNTAIN

DIST. 18

(Sheet 16)

(Sheet 18)

(Sheet 22)

(Sheet 23)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 13)

N

(Sheet 17)

(Sheet 19)

(Sheet 23)

(Sheet 24)

DISTRICT 14

PERRYS MILL

DISTRICT 18

MILLERS COVE OR WALLAND

DISTRICT 15

TUCKALEECHEE

DIST. 8

Keeble Chapel

Cold Springs School

Walker Chapel

Cowan Springs

Melrose

Mtn. View Church

Watertown

Garland Hollow

Walland

LITTLE RIVER

Hodge Branch

Roaring Branch

Huskey Branch

Double Reed Creek

Smith Branch

Dick Creek

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

N

(Inset)

(Inset Sheet 8)

(Sheet 18)

(Sheet 13)

DISTRICT 18

MILLERS COVE OR WALLAND

DISTRICT 15

TUCKALEECHEE

DISTRICT 13

UCEBA

DISTRICT 14

PERRYS MILL

DISTRICT 18

MILLERS COVE OR WALLAND

SEVIER COUNTY

Bear Wallow Br.

Double Branch

Reed Creek

Carr Creek

Swanner Branch

Ellejoy Creek

Milstone Creek

Long Hollow

Double Branch

Bear Wallow Branch

(Sheet 24) (Sheet 25)

(Sheet 19)

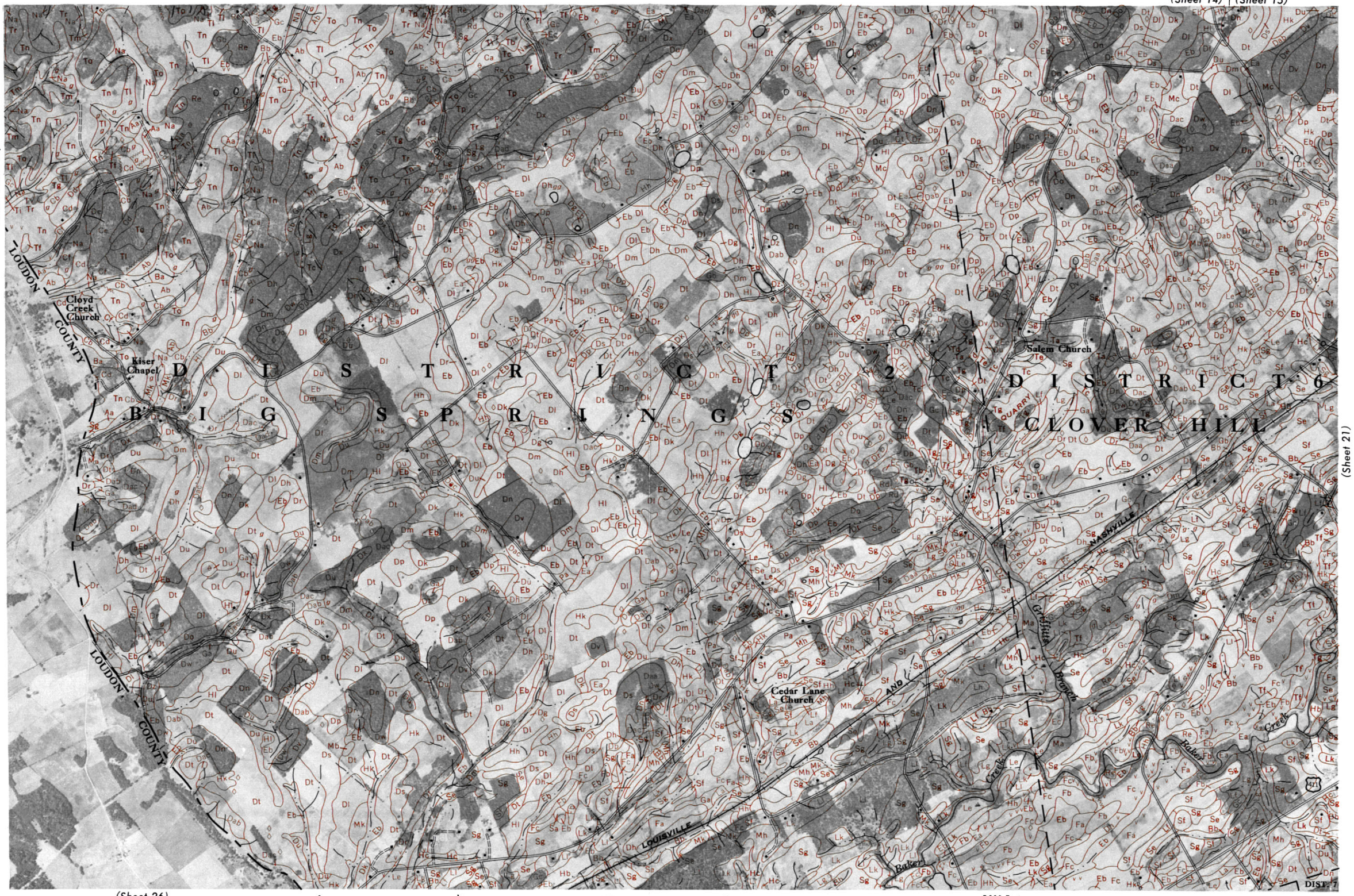
0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 14) | (Sheet 15)



This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 20)

(Sheet 22)

(Sheet 27)

N

DISTRICT 19

DISTRICT 6

DISTRICT 7

Clover Hill Church

Hopewell Church and Cemetery

Clover Hill

Binfield

Oakland Church

Spring View Church

Mt. Carmel Church

Carpenter Campground

Baker Creek

NASHVILLE AND LOUISVILLE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 16) | (Sheet 17)

(Sheet 21)

(Sheet 23)

(Sheet 28)

N

DISTRICT 8

CROOKED CREEK DISTRICT

DISTRICT 7

CARPENTER CAMP GROUND

Forest Hill

Chilhowee View School

Piney Grove Church

Blockhouse

Old Piney Church

Matthews Branch

Crooked Creek

North Fork

Little Tennessee River

Crooked Creek

Middle Fork

Scale 1:20000

0 ½ 1 Mile

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 17) | (Sheet 18)

N

(Sheet 22)

(Sheet 24)

DISTRICT 8
CROOKED CREEK

DISTRICT 18
MILLERS COVE OR WALLAND

MOUNTAIN

CHILHOWEE

Crooked Creek
South Fork Moore
Birchfield Ch Church
Dunlap Branch
Flat Creek
Hesse Creek
Hurricane Branch
Trunk Branch
Blair Branch
(PROPOSED NATIONAL PARK BOUNDARY)

(Sheet 29)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 18) | (Sheet 19)

N

(Sheet 23)

(Sheet 25)

(Sheet 30)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 19)

N

(Sheet 24)

DISTRICT 15

TUCKALEECHEE

SEVIER COUNTY

(PROPOSED BOUNDARY)

GREAT SMOKY MOUNTAINS NATIONAL PARK

SEVIER COUNTY

Walker Hollow
Rudd Hollow
Hollow
Dunn Hollow
Hollow
Lemon Hollow
Patterson Hollow
Hollow
Bonner Hollow
Paw Paw Hollow
Smith Hollow
Brandy Mtn.
Cedar Branch
Rudd Branch
Brickey Branch
Coker Hill Branch
Clabby Branch
Branch
Meadow Creek
Cane Branch
Big Branch
Hollow
Hollow
Hollow
Hollow
Russell Hollow

Brickley Cemetery
Coker Hill School
Coker Hill Chapel
Bethel Church

LITTLE RIVER
RIVER

(Sheet 31)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 20)

BLOUNT COUNTY, TENNESSEE

N

DISTRICT 6

DIST. 7

DISTRICT 2

BIG SPRINGS

DEWEES TERRACE

LOUISVILLE AND NASHVILLE

LOUDON COUNTY

LOUDON COUNTY

Baker Creek

Little Baker Creek

Brick Mill

Baker Creek Church

Liberty Church

Williamson Branch

Weed Spring

(Sheet 27)

(Sheet 33)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

N

(Sheet 26)

(Sheet 28)

Gospel Church

Baker Creek

Little Baker Creek

DISTRICT 7

CARPENTER CAMP GROUND

Rush Strong School

Centenary Church

Mint

Centenary Church

Lambert Cemetery

Creek

DIST. 1

Ninemile

REAGAN BRIDGE

Little Ninemile Creek

Christie Hill School

Creek

Gospel Temple Church

Old Kagleys Church

Sixmile

(Sheet 34)

0 ½ 1 Mile

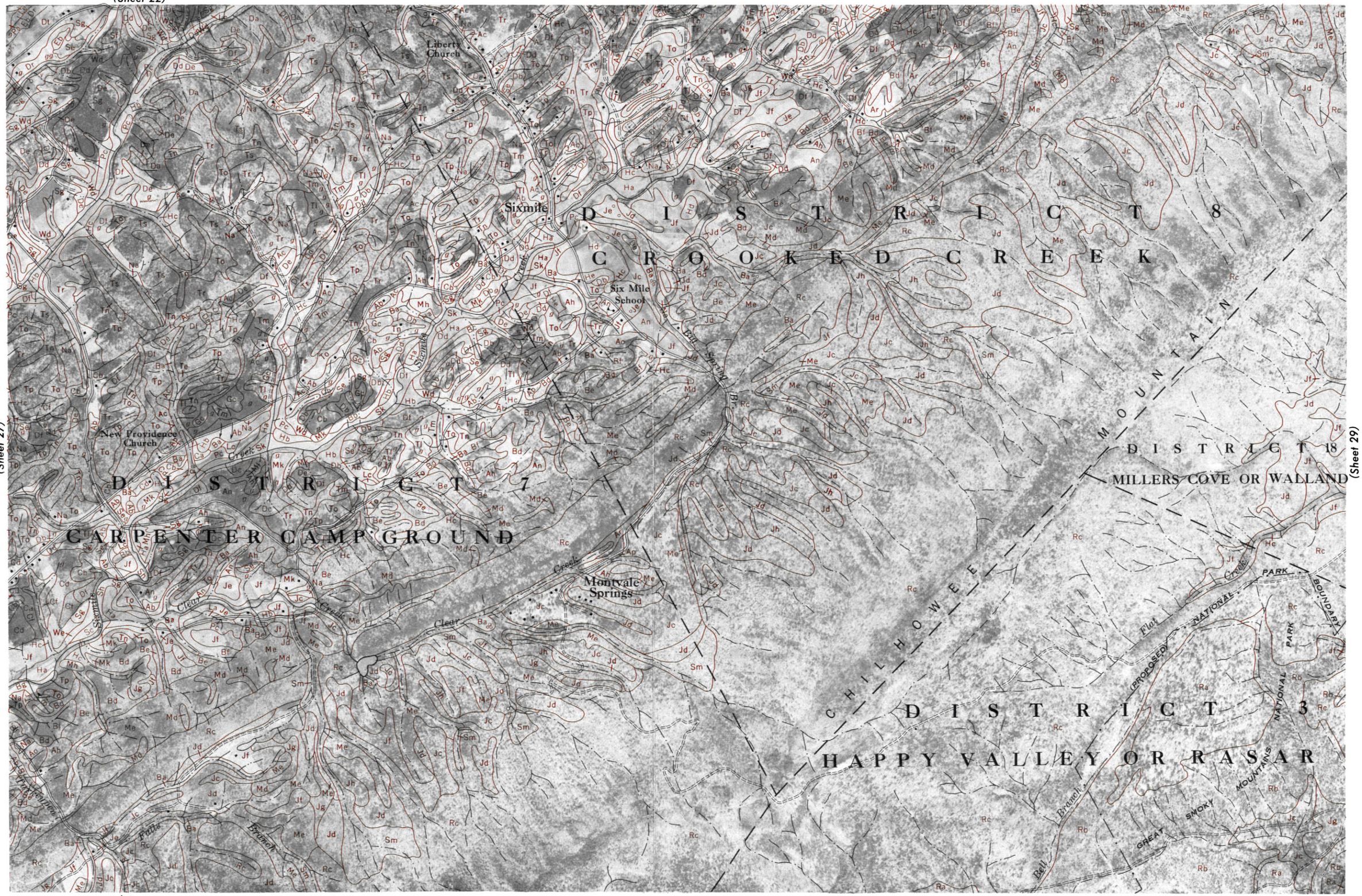
Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 22)

N



(Sheet 27)

(Sheet 29)

(Sheet 35)

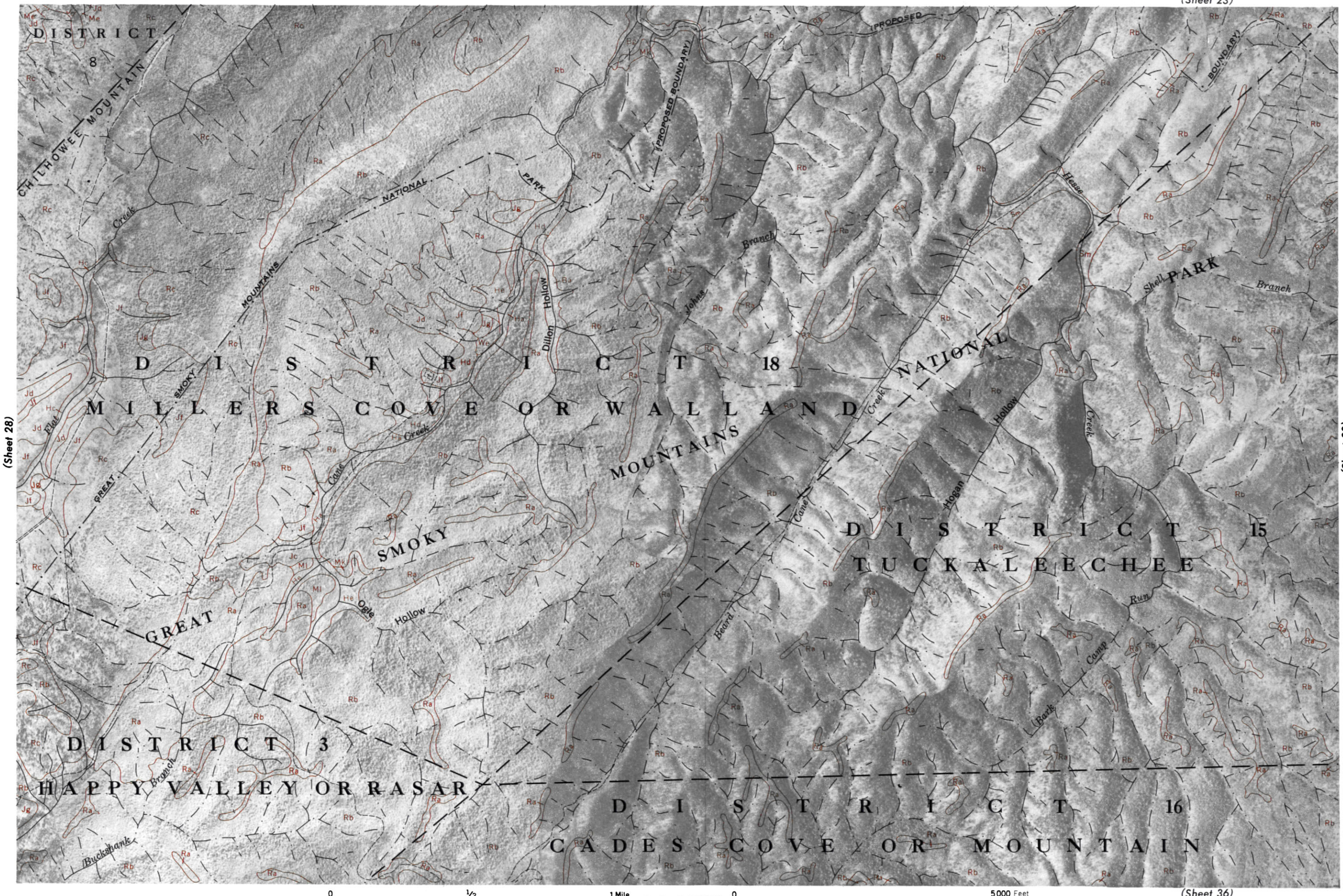
0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 23)



(Sheet 28)

(Sheet 30)

(Sheet 36)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 24)

N

(Sheet 29)

(Sheet 31)

(Sheet 37)

DISTRICT 15

TUCKALEECHEE

DISTRICT 16

CADES COVE OR MOUNTAIN

Laurel Lake

Dunn Spring

Smoky Mountains Caverns

Lawson Crossroad

Bull Cave

Red Bank School

Slate Quarry Hollow

Cooper Hollow

Fox Hollow

Hesse Creek

Water

GREAT SMOKY MOUNTAINS NATIONAL PARK

BOUNDARY

(PROPOSED)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 25)

N

(Sheet 30)

Harry Br.
Hollow
(PROPOSED BOUNDARY)
Orchard
LITTLE RIVER
LITTLE
RIVER
Big Br.
GORGE
Sm
Meigs
Creek
PARK
Flats
Branch
Whiteoak
NATIONAL
DISTRICT 15
TUCKALEECHEE
Middle
Branch
MOUNTAINS
Meadow
Prong
SMOKY
GREAT
West
Creek
Prong
Lower
Little
River
DISTRICT 16
CADES COVE OR MOUNTAIN
Spence
Branch
Little
Walker Fields
River
Honey
Deer
Camp
Branch
Cove
Spruce
Branch
Flats
Branch
(Approximate Boundary)
SEVIER
COUNTY

0 ½ 1 Mile
Scale 1:20000
0 5000 Feet

(Sheet 38)

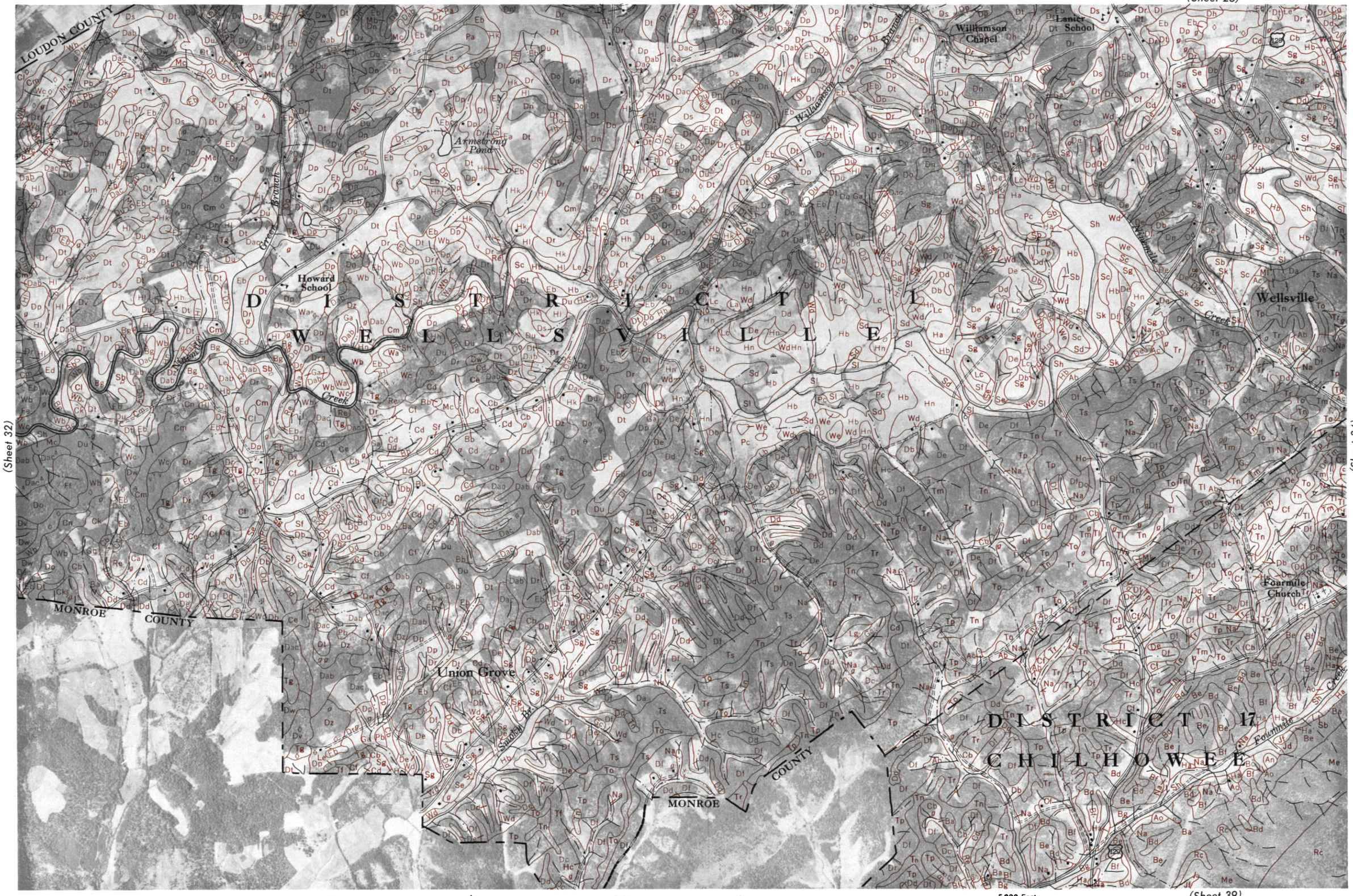
N

(Sheet 33)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet


LOUDON COUNTY
Armstrong Pond
Williamson Chapel
Lanier School
Howard School
DISTRICT 15
WELLS VILLE
Wellsville
Fourmile Church
MONROE COUNTY
Union Grove
MONROE COUNTY
DISTRICT 17
CHILHOWEE
(Sheet 32)
(Sheet 34)
(Sheet 39)
N
0 ½ 1 Mile
Scale 1:20000
0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 27)

N

(Sheet 33)

(Sheet 35)

(Sheet 40)

DISTRICT 1
WELLSVILLE

DISTRICT 7
CARPENTER CAMP GROUND

DISTRICT 17
CHILHOWEE

CHILHOWEE MOUNTAIN

Nelson Chapel

Kagley Chapel

Swanne Creek

Little Mountain Branch

Clear Creek

Pourmile Creek

Allegheny Springs

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

N

DISTRICT 7

CARPENTER CAMP GROUND

CHILHOWEE MOUNTAIN

Happy Valley

DISTRICT 3

HAPPY VALLEY OR RASAR

Abrams Creek

PARK

NATIONAL

BOUNDARY

MOUNTAINS

SMOKY

GREAT

DISTRICT 16

CADES COVE OR MOUNTAIN

(Sheet 34)

(Sheet 36)

(Sheet 41)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 29)

N

DISTRICT 3

HAPPY VALLEY OR RASAR

DISTRICT 16

CADES COVE OR MOUNTAIN

Abrams Creek

Wilson Creek

Arbutus Branch

Stony Creek

McCully Branch

Abrams Creek

Anthony Cr

Abrams Creek

PARK

NATIONAL

SMOKY MOUNTAINS

GREAT

(Sheet 35)

(Sheet 37)

(Sheet 42)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 30)

DISTRICT 15
TUCKALEECHEE

(PROPOSED) NATIONAL PARK BOUNDARY

D I S T R I C T 16

CADES COVE OR MOUNTAIN

PARK NATIONAL MOUNTAINS

Cades Cove

GREAT SMOKY

Anthony Creek

Abrams Creek

Roaring Creek

N

(Sheet 36)

(Sheet 38)

(Sheet 43)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

38

BLOUNT COUNTY, TENNESSEE

(Sheet 31)

N

(Sheet 37)

DISTRICT 16

CADES COVE OR MOUNTAIN

GREAT SMOKY MOUNTAINS NATIONAL PARK

SEVIER COUNTY

Creek

River

Laurel

Little

Prong

West

Fork

Cove

Creek

Middle

Prong

Little

River

(Sheet 44)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

MONROE COUNTY

MONROE COUNTY

Pumpkin Center

DISTRICT 17

CHILHOWEE

LITTLE - TENNESSEE - RIVER

MONROE COUNTY

Harrison Branch

N

(Sheet 40)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

(Sheet 34)

N

(Sheet 39)

(Sheet 41)

(Sheet 45)

DISTRICT 7

CARPENTER CAMP GROUND

DIST. 3

HAPPY VALLEY OR RASAR

CHILHOWEE MOUNTAIN

DISTRICT 17

CHILHOWEE

Chilhowee

Tallassee

Lower Chilhowee Church

Walker Branch

Fortner Branch

Cochran Creek

Harrison Branch

Chilquee Branch

(PROP. NAT. PARK BDRY. GREAT SMOKY MTS. NATIONAL PARK)

MONROE COUNTY — LITTLE TENNESSEE RIVER — MONROE COUNTY

L. TENN. R.

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

N

DIST. 7

DISTRICT 3

HAPPY VALLEY OR RASAR

GREAT SMOKY MOUNTAINS NATIONAL PARK

DISTRICT 16

CADES COVE OR MOUNTAIN

DISTRICT 17

CHILHOWEE

Abrams Creek

Panther Creek

Bear Creek

Blacksmith Creek

Slaty Branch

Laurel Branch

BOUNDARY

NATIONAL PARK

GREAT SMOKY MOUNTAINS

LITTLE TENNESSEE RIVER

MONROE COUNTY TENNESSEE

SMOKY

(Sheet 40)

(Sheet 42)

(Sheet 45)

(Sheet 46)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

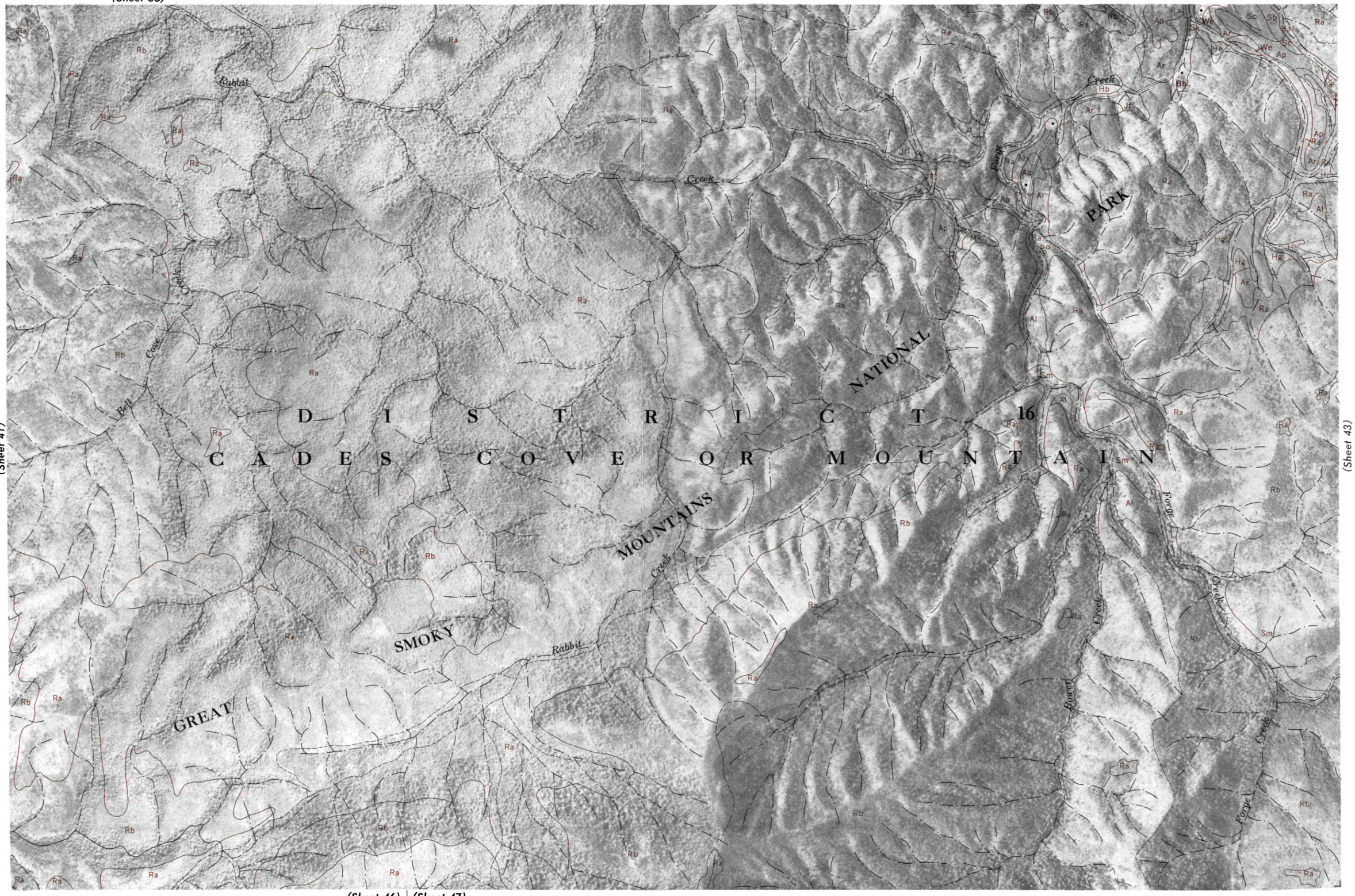
BLOUNT COUNTY, TENNESSEE

(Sheet 36)

N

(Sheet 41)

(Sheet 43)



(Sheet 46) | (Sheet 47)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 37)

N

DISTRICT 16

CADES COVE OR MOUNTAIN

Sugar Cove Branch

Abrams Creek

Narrow Creek

APPALACHIAN TRAIL

NORTH CAROLINA

SWAIN COUNTY

(Sheet 42)

(Sheet 44)

(Sheet 47)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BLOUNT COUNTY, TENNESSEE

N

GREAT SMOKY MOUNTAINS NATIONAL PARK

DISTRICT 16

CADES COVE OR MOUNTAIN

West Prong Little River

Bee Cove Creek

Middle Prong Little River

Rb

Ra

APPALACHIAN TRAIL NORTH CAROLINA

SEVIER COUNTY

SWAIN COUNTY

(Sheet 43)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

(Sheet 40) | (Sheet 41)

N

GREAT SMOKY MOUNTAINS NATIONAL PARK

DISTRICT 17

CHILHOWEE

MONROE — LITTLE — COUNTY — TENNESSEE — RIVER

NATIONAL PARK BOUNDARY

Cedar Hollow

Strawberry Hollow

Calderwood

LAKE COUNTY

CALDERWOOD MONROE

power plant

hydro-electric tunnel

CALDERWOOD DAM

Sk Sl Bg Bc Bb Sh Ra Rb Re Ar Ba Jf

129

0 ½ 1 Mile

Scale 1:20000

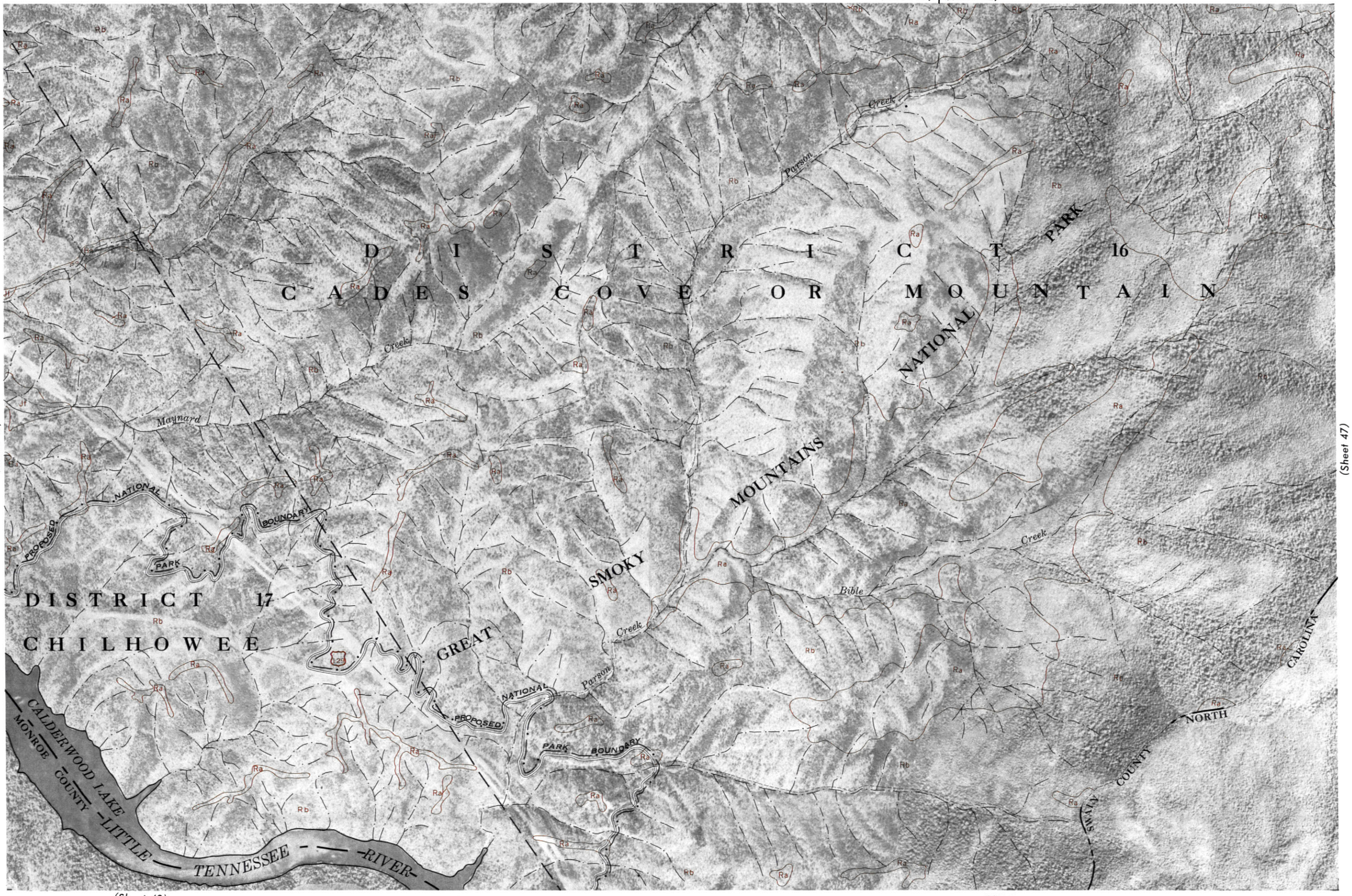
0 5000 Feet

(Sheet 46)

BLOUNT COUNTY, TENNESSEE

(Sheet 41) | (Sheet 42)

N



(Sheet 45)

(Sheet 47)

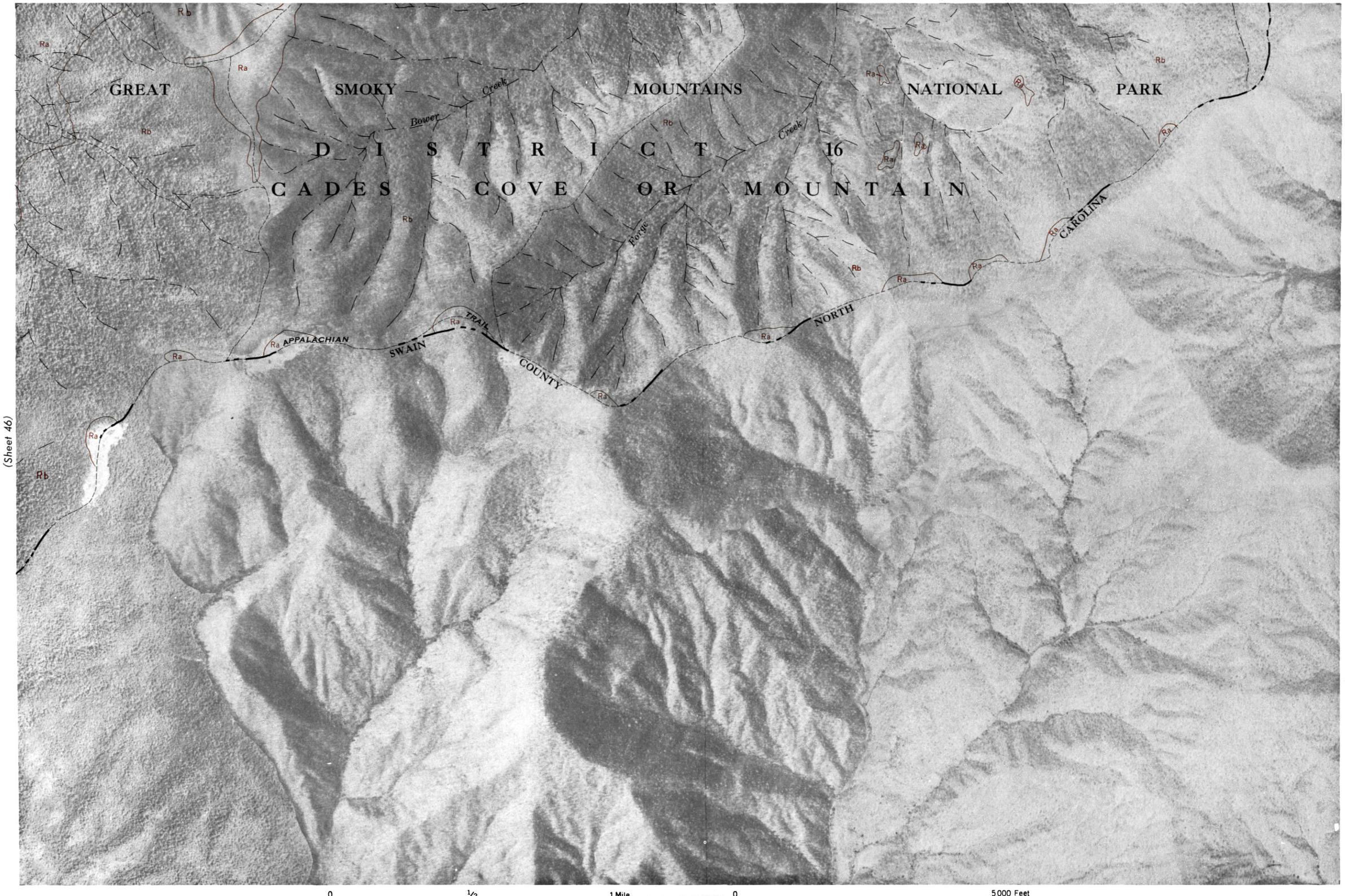
(Sheet 48)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.



(Sheet 46)

N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 46)

BLOUNT COUNTY, TENNESSEE

N

DISTRICT 16

CADES COVE OR MOUNTAIN

GREAT SMOKY MOUNTAINS NATIONAL PARK

NATIONAL PARK BOUNDARY

NORTH CAROLINA

DISTRICT 17

CHILHOWEE

LITTLE - TENNESSEE - RIVER

MONROE COUNTY

SWAIN COUNTY

NORTH CAROLINA
GRAHAM COUNTY

Niggerkill Branch

Cooper Camp Branch

Tunnel Branch

Branch

State Line

Rb

Ra

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1953.

SOIL ASSOCIATION MAP
BLOUNT COUNTY, TENNESSEE

1 DEWEY-DECATUR-DUNMORE
2 DUNMORE-PACE-GREENDALE
3 SEQUOIA-LITZ-HAMBLEN
4 TELLICO-ALCOA-NEUBERT
5 CUMBERLAND-ETOWAH-EMORY
6 FARRAGUT-SEQUOIA
7 TALBOTT-COLBERT-LINDSIDE
8 DANDRIDGE-WHITESBURG-HAMBLEN
9 BLAND
10 JEFFERSON-MONTEVALLO
11 LEHEW
12 ALLEN-HAYTER
13 RAMSEY

N

1 0 1 2 3 4 Miles